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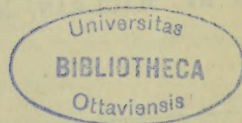
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SESSIONAL PAPERS.

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FIRST SESSION OF THE FIFTH PARLIAMENT

OF THE



DOMINION OF CANADA

SESSION 1883.

SESSIONAL PAPERS

VOLUME I
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- No. 17b. Return to Address; Copies of correspondence, &c., touching the appointment of a Commissioner in connection with the Revision of the Canadian Statutes.

- No. 18...** DOMINION POLICE:—Statement of expenditure during the year 1882. (*Not printed.*)
- No. 19...** BANKS:—Lists of Shareholders of the Canadian Banks. (*Not printed.*)
- No. 20...** LAND IMPROVEMENT FUND:—Return to Address; Copies of all letters, &c., between this Government and the Governments of Ontario and Quebec, from 1st June, 1882, relating to this Fund and unsettled accounts, also a statement showing the present balances, if any, due to the said Provinces. (*Not printed.*)
- No. 21...** SUPERANNUATION:—Statement of name, &c., of each person superannuated, &c., in accordance with the Civil Service Act, 45 Vic., chap. 4, sec. 55, sub-sec. 3.
- No. 21a.** Return of the names of the persons on the Superannuation List, as on 23rd February, 1883, together with the amount of the annual allowances paid each.
- No. 21b.** Return (in part) to Order; Statement showing separately for each year since the establishment of the Superannuation Fund:—1. The number of persons on the list for the year as entitled to the benefit of the Act. 2. The number superannuated during the year under the Act. 3. The number retired during the year on a gratuity under the Act. 4. The total amount paid into the Fund from the beginning by those who were, during the year, superannuated or retired on a gratuity; distinguishing between those whose superannuation was caused by the abolition of office. 5. The number of persons on the list, for the year, who died in the service; —and 6. The total amount paid into the Fund from the beginning by those who, during the year, died in the service.
- No. 22...** UNFORESEEN EXPENSES:—Statement of payments charged to, by Order in Council, from 1st July, 1882, to date, in accordance with the Act 42 V., chap. 2, schedule B.
- No. 23...** INTERIOR:—Annual Report of the Department of, for the year 1882.
- No. 24...** CENSUS AND STATISTICS:—Report, required by sec. 25, of the Census and Statistics Act, of 1879, of operations and expenses during the calendar year, 1882. (*Not printed.*)
- No. 25...** BONDS AND SECURITIES:—Detailed statement of, registered in the Department of the Secretary of State of Canada, submitted to Parliament, in compliance with the Act 31 Vic., chap. 37, sec. 15. (*Not printed.*)
- No. 26...** GOVERNOR GENERAL'S WARRANTS:—Statement of, issued since the last Session of Parliament, in accordance with the Act 41 Vic., chap. 7, sec. 32, sub-sec. 2, on account of the fiscal years, 1881-82, and 1882-83.

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- No. 27...** CANADIAN PACIFIC RAILWAY:—Return to Resolution; Report giving full information on all subjects affecting the Railway, up to the latest date: 1. The selection of the route; 2. The progress of the work; 3. The selection or reservation of land; 4. The payment of money; 5. The laying out of branches; 6. The progress thereon; 7. The rates of tolls for passengers and freight; 8. The particulars required by the Consolidated Railway Act and amendments thereto, up to the end of the previous fiscal year; 9. Like particulars up to the latest practicable date before the presentation of the Return; 10. Copies of all Orders in Council and of all Correspondence between the Government and the Railway Company, or any member or officer of either, relating to the affairs of the Company.
- No. 27a.** Return to Resolution; Memorandum as to substitution by the Railway of Credit Valley Stock for \$1,000,000 cash deposit.
- No. 27b.** Return to Resolution; Report of the Company, in account with the Government of Canada, viz.:—Rails Advance Account, Land Grant Bond Account, Current Account and Subsidy Account. (*Not printed.*)
- No. 27c.** Return to Resolution; Schedule of Correspondence as to Canadian Pacific Land Grant Bonds.
- No. 27d.** Return to Resolution; Memorandum of the progress of construction of the Railway, dated Montreal, 21st February, 1883. Also, a map of the country to be traversed by the Railway. (*Not printed.*)

- No. 27e. CANADIAN PACIFIC RAILWAY :—Return to Resolution ; Further Report giving full information, not contained in No. 27 ; and also, a plan showing lands for expropriations of the Railway, extending from the south-westerly side of the village of Prince Arthur's Landing easterly to Current River.
- No. 27f. Return to Resolution ; Copies of communications of the Railway on the subject of the allotment and conveyance of lands, as they are earned under the contract.
- No. 27g.. Return to Order ; Statement, in detail, of all sums expended in connection with the Canadian Pacific Railway Commission, with dates and names of the persons paid, and particulars of the service in respect of which payment is made—copy of all correspondence, contracts, accounts or arrangements, not already brought down, as to the printing of the evidence or Report.
- No. 27h. Return to Resolution ; Map showing the Railway, as located for construction between Callander and Algoma Mills, 191 miles. (*Not printed.*)
- No. 27i.. Copies of contracts for the Railway, in terms of section 19 of the Act 37 Victoria, chapter 14, as follows :—
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 Between John McDonald and Her Majesty the Queen, etc.,—to construct six combined passenger and freight buildings on 42nd contract. (Contract No. 97.)
 Between Colin Nichol Black and the Minister of Railways and Canals, etc., for the supply of 30,000 tamarack ties, 8'—0 x 7' x 6' at 25 cts. each. (Contract No. 98.)
- No. 27j.. Return to Resolution ; Location eastern section, Current Creek to Nipigon, and freight tariff, western division.
- No. 27k.. Return to Order ; Statement of the total quantity of land agreed to be sold by the Company, the total price agreed to be paid therefor, during each month up to the 1st day of March, 1882, distinguishing between the sales of farming lands and those of town, village or station lots, woodland, mineral, quarry lands and other special sales, and including the quantities and prices realized for lands in which the Company became interested by agreements in connection with the location of stations. (*Not printed.*)
- No. 27l.. Return to Resolution ; Communication from W. C. Van Horne, General Manager, dated Montreal, 18th April, 1883, respecting additional information concerning the line proposed to be adopted through the Rocky and Selkirk Mountains.
- No. 27m.. Return to Order ; Statement of duty paid by the Company on articles imported by them, from the date of their contract until 28th February, 1883, specifying the ports of entry of such goods, and the amount paid at each port. (*Not printed.*)
- No. 27n.. Return to Address ; Copies of the official memorandum of the Company, dated 12th December, 1882, describing its position and prospects. The advertisement published thereafter by the Company asking for subscriptions for its increased capital stock ; and all memoranda in connection therewith.
 Statement showing the amount of the subscribed stock of the Company prior to the increase of its capital stock from \$25,000,000 to \$100,000,000, and the amounts paid up on such subscribed stock, with the date of each payment in cash, and also the amounts (if any), satisfied by the acquisition of property or otherwise, specifying in such case the consideration therefor and the amount of stock given, and the date.
 Statement of the facts as to the acquisition by the Company of the Canada Central Railway, the Montreal, Ottawa and Occidental Railway, and interest in the Credit Valley Railway and Ontario and Quebec Railway.
 Statement of the various matters required to be returned under the Consolidated Railway Act, 1879, and amendments thereto.
 Statement of the total sum expended up to the 1st of February, 1883, by the Company under their contract.

- No. 27o. CANADIAN PACIFIC RAILWAY:—Return to Order; Map or maps showing (1) the location of the railway so far as approved or constructed; (2) its location so far as proposed, to Government, but not yet approved; (3) the location of any branches constructed and of any now contemplated by the Company, so far as the Government is advised; (4) the lands set apart for the Company but not yet granted; (5) the lands granted; (6) the lands applied for but not yet set apart. (*Not printed.*)
- No. 27p. Return to Order; Statement showing the reduction made by change of construction in Contracts A and B, and the amount involved by such change; also, the amount of each payment made to the respective contractors each month since the letting of the work; also, all claims made by the contractors on each of these contracts, and the date of each claim. (*Not printed.*)
- No. 27q. Papers in relation to Sections 14 and 15, Joseph Whitehead, Contractor. (*Not printed.*)
- No. 27r. Memorandum respecting Thunder Bay and River Kaministiquia.
- No. 28... DOMINION STATUTES:—Official Return of the distribution of, being 45 Victoria, 1882. (*Not printed.*)
- No. 29... PENITENTIARIES IN CANADA:—Report of the Minister of Justice on, for the year ended 30th June, 1882.
- No. 29a. Supplementary Return; Expenditure of the British Columbia Penitentiary, for the fiscal year ended the 30th June, 1882. (*Not printed.*)
- No. 30... RECEIPT AND EXPENDITURE:—Return to Order; Return of, in detail, chargeable to the Consolidated Fund, from 1st July, 1882, to 1st February, 1883. (*Not printed.*)
- No. 31... MILITIA:—Return to Order; Statement of the number of Veterans of 1812 now surviving; of the number who have died since 1875, and of the number of widows of deceased who have applied for assistance. (*Not printed.*)
- No. 31a. Return to Order; Statement containing the names and residences of all the militiamen of 1812 who received their pensions during the last fiscal year, as well as the sum given to each of them. (*Not printed.*)
- No. 31b. Return to Order; Copies of all tenders, accounts, &c., in connection with the purchase of blankets for the militia during the recess. (*Not printed.*)
- No. 31c. Return to Order; Return of all petitions and correspondence with respect to new guns for the Richmond Field Battery. (*Not printed.*)
- No. 31d. Return to Order; Copies of all correspondence relating to the application of John Stewart, of Woodbridge, one of the Volunteers of 1837-38, for assistance, for his services in defence of his country during those years. (*Not printed.*)
- No. 31e. Return to Order; Return showing the number of officers, non-commissioned officers and men who received instruction in "A" and "B" Batteries in each year since their establishment; the number awarded a certificate of qualification in each year, and the entire cost per annum of each battery for the same time.
- No. 31f. Return to Address (Senate); Copies of all tenders for work at the camp at Berthier, in 1832, stating the rates of the various tenders, and the names of persons to whom the contracts were awarded, etc. (*Not printed.*)
- No. 32... CANADIAN EXTRADITION ACT:—Return to Address; Correspondence, not already brought down, touching the Act, and the suspension of the Imperial Act within Canada.
- No. 33... RETURNING OFFICERS:—Return to Order; List appointed for the General Election, 1882, other than Registrars or Sheriffs, occupations and residences of such officers, and a list of the Sheriffs and Registrars for the Districts in which such officers were appointed.
- No. 34... BANQUE DE ST. JEAN:—Return to Order; Copies of the returns, annual and monthly, made by the Bank since 1875, to the Government; also, copies of the certificates granted by the Treasury Board to the said Bank on going into operation. (*Not printed.*)

- No. 35...** **NADIAN TOBACCO**:—Return to Order; Return shewing: 1st. The number of licensed tobacco manufactories on 1st February, 1883, in which Canadian leaf is exclusively used; 2nd. The quantity of Canadian leaf used in tobacco manufactories since the passing of the Inland Revenue Act of 1880, to 1st February, 1883; and 3rd. The quantity of cigars and Cavendish produced, respectively, since 1st May, 1880, to 1st February, 1883, in manufactories in which Canadian Leaf is exclusively used. (*Not printed.*)
- No. 35a.** Return to Order; Copies of all documents, &c., relating to a seizure of tobacco on the premises of Mr. N. Bernatchez, and other merchants, of Montmagny. (*Not printed.*)
- No. 36...** **COAL**:—Return to Order; Return showing the quantity in tons of coal exported from each port in Nova Scotia for the year ending June 30th, 1882; Also, for the six months ending December 31st, 1882, and the countries to which exported; Also, quantities sent by railway, and by water (separately), to any ports of Quebec and Ontario, naming places sent to.
- No. 36a.** Coal Lands; Regulations for the disposal of, approved by His Excellency the Administrator of the Government in Council, on the 2nd March, 1883, substituted for those of the 17th December, 1881.
- No. 36b.** Return to Order; Copies for all applications for sales or leases, and all correspondence or reports touching all leases of coal lands in the North-West, not already brought down; and a statement of the payments made under any such leases.
- No. 36c.** Return to Order; Return giving a full statement of all coal entered ex-warehouse free or for exportation, during the years ending 30th June, 1881 and 1882.
- No. 37...** **FISHERIES**:—Copies of Orders in Council, instructions and forms for Fishing Bounty, submitted in compliance with the Act 45 Vic., cap. 18.
- No. 37a.** Return to Order; Return of leases or licenses to fish on rivers in New Brunswick and the annual rent received on each; Also, the number of leases or licenses cancelled or surrendered.
- No. 37b.** Return to Order; Return of the instructions issued to the Inspectors of the Fisheries, as to the enforcement of the Order in Council of 11th June, 1879, whereby fishing for salmon in Canada, excepting under authority from the Department of Marine and Fisheries, was prohibited, the number of seizures and informations laid before Justices of the Peace against parties fishing without such lease or license; the number of convictions obtained, etc.
- No. 37c.** Certified copy of a Report of the Hon. the Privy Council, on 2nd May, 1883, respecting an appropriation of at least \$50,000 for bounty to fishermen.
- No. 37d.** Return to Order; Return of all correspondence, etc., had from 1st January, 1877, to 31st March, 1883, between the Department of Marine and Fisheries at Ottawa and the Inspector of Fisheries for New Brunswick in reference to the claim of ex-Overseer Amos Perley, of Chatham, for services in connection with the Smelt Fishery of Miramichi, in the years 1876 to 1878.
- No. 37e.** Return to Address; Copies of all Orders in Council in force regulating the close season for Lobster Fishing, &c.
- No. 38...** **SEIZURES AND FINES**:—Return to Order; Statement showing the number of seizures made at each port of entry in the Dominion during the last fiscal year, and also during the six months ended the 31st December 1882, the fines exacted, and how disposed of. (*Not printed.*)
- No. 39...** **OCEAN MAIL SERVICE**:—Return to Address (Senate); Correspondence, &c., in the possession of any department or officer of the Government, relating to the mail service between Canada and the United Kingdom, or to the rates of freight charged by the line of steamships by which such mail service is performed.
- No. 39a.** Supplementary Return (Senate) to the preceding.
- No. 40...** **INTERCOLONIAL RAILWAY**:—Return to Order; Return showing rolling stock purchased during the year ended December 31st, 1882, &c.; also, a statement showing what has been built during the year in the Government workshops.

- No. 40a. INTERCOLONIAL RAILWAY :—Return to Order ; Statement of the revenue and working expenses for the six months of each year, ended December 31st, 1880, 1881 and 1882, under the several divisions.
- No. 40b. Return to Address; Copies of all Orders in Council, correspondence, &c., and the Commission in connection with claims made on the Government, arising out of the construction of the railway ; and statement of the matters referred to them so far ; and of the remuneration to be paid to them and the Secretary of the Commission, &c.
- No. 40c. Return to Order : All correspondence in reference to the removal and dismissal of W.D. McCallum, Chief Train Despatcher at Truro. (*Not printed.*)
- No. 40d. Return to Order ; Return of casualties on the railway, where no loss of life or personal injuries occurred, from March 1st, 1882, to March 1st, 1883, with the respective causes, &c. ; of damage to property, and amount of compensation paid, as well as claims unsettled. (*Not printed.*)
- No. 40e. Return to Order ; Copies of the accounts rendered by Doctors Lebel and Renouf, of St. Gervais, for attendance on an employé of the railway named Dionne ; and a statement of the sums to them paid. (*Not printed.*)
- No. 40f. Return to Order ; Return showing the nature of the rolling stock purchased for the railway, as contained in the item of \$153,853.84 in the Public Accounts of 1882 ; where such rolling stock was manufactured, and the price paid.
- No. 40g. Return to Order ; Return of all tenders submitted for the construction of the freight sheds and warehouses at the railway depot, St. John, N.B. ; the names of the several contractors, and the amount of each contract, the number and names of the superintendents and overseers, and the amount paid for their services. (*Not printed.*)
- No. 40h. Return to Order ; Return of the amounts paid for lands taken on Mill and Pond streets, in St. John, N.B., for the railway ; the names of the arbitrators appointed to appraise the land, the compensation paid to them and the awards made by them.
- No. 40i. Return to Order ; Return showing the rolling stock purchased for each year since the 1st of July, 1878, the nature of such rolling stock, and the place where manufactured, &c.
- No. 40j. Return to Address ; Copies of all correspondence between the Government of Nova Scotia and the Departments of Railways and Public Works, respecting the transfer of the branch railway between Truro and Pictou, and with the Halifax and Cape Breton Railway and Coal Company, respecting Eastern Extension Railway matters in Nova Scotia.
- No. 40k. Return to Order ; Copies of all correspondence relating to the steamer running in connection with the railway between Campbellton, Gaspé and intermediate ports. (*Not printed.*)
- No. 40l. Papers in relation to H. G. C. Ketchum's claim for overcharge, for the conveyance of rails 1866-67 and '68, Intercolonial Railway. (*Not printed.*)
- No. 41... PUBLIC ACCOUNTS :—Return to Address ; Copies of all Orders in Council affecting certain items in the Public Accounts, for the fiscal year ended 30th June, 1882. (*Not printed.*)
- No. 42... UNFORESEEN EXPENSES :—Return to Address ; Copies of all Orders in Council affecting certain items in the statement of payments charged to Unforeseen Expenses, referred by the House to the Select Standing Committee on Public Accounts, on the 23rd February, 1883. (*Not printed.*)
- No. 43... GOVERNOR GENERAL'S WARRANTS :—Return to Address ; Copies of all Orders in Council affecting certain items in the statement of the Governor General's Warrants, issued during the fiscal years 1881-82 and 1882-83, referred to the Select Standing Committee on Public Accounts by the House, on the 23rd February, 1883. (*Not printed.*)
- No. 44... BAPTISMS, MARRIAGES AND BURIALS :—General statements and returns of, for certain districts of the Province of Quebec, for the year 1882. (*Not printed.*)
- No. 45... DRAWBACK ON SHIPBUILDING MATERIALS :—Return to Order ; Return of all claims presented for drawback on materials used for shipbuilding, for the year ended 30th June, 1882 ; also, for the six months ended 31st December, 1882. (*Not printed.*)

- No. 45a. DRAWBACK ON MANUFACTURED GOODS:—Return to Order; Return of all claims presented for drawbacks on goods manufactured for export since 2nd March, 1882, &c.; also, copies of all regulations made by the Department with reference to such claims, together with a copy of one allowed claim and the sworn declaration thereto of each exporter of boilers, machinery, sewing machines or other manufactures of iron.
- No. 46... WHARVES AND PIERS:—Return to Order; Copies of all correspondence with reference to the construction of an addition to the pier of St. Jean Port Jolie, County of L'Islet, &c, since the appropriation made for that object during the last Session of Parliament. (*Not printed.*)
- No. 46a. Return to Order; Completing the preceding return by furnishing the date of the memorandum closing the said papers. (*Not printed.*)
- No. 46b. Return to Order; Reports, &c., in relation to the construction of a wharf or pier at St. Anne, on the Saguenay, County of Chicoutimi. (*Not printed.*)
- No. 46c. Return (in part) to Address; Correspondence, &c., relating to any claim made by the Provincial Government of Prince Edward Island, for a refund of their expenditure upon public wharves and piers, and also in connection with the maintenance of short-term prisoners in that Province since its admission to the Union. (*Printed for Distribution.*)
- No. 46d. Supplementary Return to the preceding. (*Printed for Distribution.*)
- No. 46e. Return to Order; Copy of all reports, estimates, &c., made by the Government Engineers of Port Albert Harbor, and all correspondence with the Port Albert Pier Company respecting said harbor.
- No. 46f. Return to Order; Copies of all reports, &c., made by the Government Engineers of Bayfield Harbor.
- No. 46g. Return to Order; Copies of all correspondence, appropriations, &c., relative to proposed improvement of Morpeth Harbor, on Lake Erie.
- No. 47... ST. JOHN RAILWAY BRIDGE:—Return to Order; Copies of all correspondence with the Government during the year 1882, referring to the construction of a railway bridge over the St. John, at St. John.
- No. 47a. Telegram from Shadroch Holly, Mayor of St. John, N.B., with a copy of a memorial to the Governor General, in relation to the resolution respecting the proposed loan to the St. John Bridge and Railway Company.
- No. 48... STANDARD MERIDIAN:—Return to Address (Sebate); A copy of the memorial from the Royal Society of Canada, the Canadian Institute of Toronto, and of any documents connected with the memorials, relative to the representation of Canada in the International Conference, to determine a standard meridian now contemplated by the Congress of the United States. (*Printed for Distribution.*)
- No. 49... CUSTOMS DEPARTMENT, MONTREAL:—Return to Order; Return of the names of persons in the employ of the Customs Department in the City of Montreal, as supernumerary clerks constantly employed for not less than six months previous to 1st July, 1882. (*Not printed.*)
- No. 50... DRILL SHED, IONA:—Return to Order; Copy of contract, &c., for the building of the drill-shed at Iona, Ont., with report of inspection of the same. (*Not printed.*)
- No. 51... DE LA CHEVROTIÈRE, O.C, DISMISSAL OF:—Return to Address; Copies of the Order in Council, &c., dismissing Mr. Octave C. de la Chevrotière from his position as keeper of a lighthouse situated in the Parish of Lotbinière, in the County of Lotbinière. (*Not printed.*)
- No. 52... BREAKWATERS:—Return to Order; Return of the advertisement for construction of the Breakwater at Port Lorne, N.S., and the several tenders therefor; the party to whom the contract was awarded, and the amount of such contract. (*Not printed.*)
- No. 52a. Return to Order; Copies of all papers, reports of engineers, &c., relating to the building of a breakwater at New Harbor, Guysboro' County, N.S. (*Not printed.*)
- No. 52b. Return to Order; Copies of all correspondence, &c., relating to the building of a breakwater on the west side of Liverpool Bay, from 1870 to 1882. (*Not printed.*)

- No. 52c. **BREAKWATERS** :—Return to Order; Copies of Engineer's report of survey made at Brae, Prince County, Prince Edward Island, during last summer, with a view to making harbor improvements. (*Not printed.*)
- No. 53... **MILLER, J. A., JUDGE** :—Return to Order; Copies of all correspondence with Mr. J. A. Miller, late Justice of the Court of Queen's Bench, Manitoba, prior to his appointment, relating to his becoming Justice of that Court, and subsequently to his appointment on the subject of the resignation of his office. (*Not printed.*)
- No. 54... **SUMMERSIDE HARBOR** :—Return to Order; Copy of the Engineer's Report of Survey made at Summerside Harbor, Prince County, Prince Edward Island, during the last summer, with a view to improving the navigation of said Harbor. (*Not printed.*)
- No. 55... **RECIPROCITY BETWEEN CANADA AND U. S.** :—Return to Address; Copies of all correspondence between the Governments of Canada and the United States, or any Board of Trade in Canada or the United States, upon the question of Reciprocal Trade relations between the two countries, on the general basis of the Reciprocity Treaty of 1854, since 1878.
- No. 56... **ROYAL MILITARY COLLEGE** :—Return to Order; Return of the number of Cadets that have graduated at the Royal Military College since its establishment; the number who have obtained Commissions in the Imperial service; the number who have been appointed to the permanent Militia Corps; Also, names of any officers appointed to "A" and "B" Batteries of Artillery since February 6th, 1880, who have not graduated at the Royal Military College, and of those appointed who graduated at the College. (*Not printed.*)
- No. 56a. Return to Order; Return showing the name, salary and duty of each officer on the Instruction Staff of the Royal Military College, with the date of his appointment; also a Return showing the full staff of officers of "A" and "B" Batteries, respectively, with salary and date of appointment. (*Not printed.*)
- No. 57... **QUACO LIGHTHOUSE** :—Return to Order; Return of the tenders for the re-building of the Lighthouse at Quaco, New Brunswick, and to whom the Contract was awarded, and the amount of such Contract. (*Not printed.*)
- No. 58... **DISASTERS TO CANADIAN VESSELS IN THE GREAT LAKES** :—Return to Order; Return of all correspondence relating to the disasters which have occurred to Canadian vessels, navigating the Great Lakes and the Georgian Bay, within the past three years, &c. (*Not printed.*)
- No. 58a. **REGISTERED VESSELS** :—Return to Order; Statement showing the vessels registered in the Province of Quebec; also, the number of vessels sold and lost between 1st January, 1873, and 1st January, 1882. (*Not printed.*)
- No. 58b. **VESSELS IMPORTING SUGAR, SYRUP AND MOLASSES** :—Return to Order; Return showing the number of vessels with their tonnage, nationality and port of entry, in which sugar, syrup and molasses were imported into this country during the fiscal year ended 30th June, 1881; the quantity of sugar above 14 D.S., and of a lower grade by each vessel or steamship; also a like Return from 1st July, 1881, to 1st January, 1882. (*Not printed.*)
- No. 59... **INTOXICATING LIQUORS** :—Return to Order; Statement showing the quantities of distilled and fermented liquors, imported and manufactured for consumption in Canada, from 1868 to 1882, computed in Imperial gallons, each Province separately, the value of the same and duty paid thereon; the amount of materials used in brewing and distilling alcoholic liquors in the several Provinces of Canada during the same years.
- No. 59a. Return to Order; Copies of any petitions from the Province of Quebec, on the subject of proposed legislation, as to the sale of intoxicating liquors. (*Not printed.*)
- No. 59b. Return to Address; Copies of despatches, &c., on the subject of Canadian and Provincial Laws, as to the imposition of restrictions on the sale of intoxicating drinks. (*Not printed.*)
- No. 60... **FABRE, HON. HECTOR** :—Return to Address; Copies of all correspondence, &c., respecting the appointment of Hon. Hector Fabre to the position he now occupies in France; also, statement of his duties and the salary or commission paid or to be paid for such services, &c; also, all reports on the results of the mission. (*Not printed.*)

- No. 61... SALE OF LIQUOR:—Return to Order; Copies of all correspondence between any Member of the Government and any licensed victuallers, and of all petitions, &c., presented by any such person on the legislation affecting the sale of liquors. (*Not printed.*)
- No. 62... DOMINION BAILIFFS:—Return to Address; Copies of all correspondence with, and petitions from municipalities, referring to the appointment of, to convey prisoners from the county gaols to the Penitentiaries. (*Not printed.*)
- No. 62a. Supplementary Return to the preceding. (*Not printed.*)
- No. 63... SUPREME COURT, AMENDED RULE:—Statement of the Supreme Court of Canada, that Schedule D, annexed to the rules of that Court, be amended; and that an allowance shall be taxed by the Registrar to the duly entered Agent in any appeal, in the discretion of the Registrar, to \$20. (*Not printed.*)
- No. 64... HYDROGRAPHICAL SURVEY:—Return to Order; Copies of all correspondence between any person and the Government, in relation to the hydrographical survey of the great lakes, the River and Gulf of St. Lawrence, and the other maritime coasts of Canada.
- No. 65... SALT DUTIES:—Return to Order; Copies of all correspondence, &c., in the hands of Government, on the subject of duties on salt. (*Not printed.*)
- No. 66... FOG-WHISTLE, SHELBURNE:—Return to Order; Copies of all correspondence, &c., received by the Department of Marine and Fisheries since 1st January, 1881, in reference to the erection of a fog-whistle at Shelburne Harbor, Nova Scotia. (*Not printed.*)
- No. 67... COUNTY COURTS:—Return to Address; Copy of all correspondence between the Governments of New Brunswick and the Dominion, in relation to the creation of a new County Court in that Province, and the appointment of a Judge thereto. (*Not printed.*)
- No. 67a. Return to Address; Return of cases tried at each of the County Courts of the Counties of Kings and Albert, since 1st June, 1882, with the amount of verdicts and judgments entered thereon. (*Not printed.*)
- No. 67b. Return to Order; Copies of all correspondence between the Government and the County Court Judges of the Dominion, and others, respecting the resolution submitted to the House during last Session of Parliament, by the late Minister of Justice, on the subject of the proposed increase of the salary of such Judges. (*Not printed.*)
- No. 68... MARITIME COURT:—Return to Order: Return showing the cases disposed of, &c., by the Judge and several Surrogate Judges of the Maritime Court, since the creation of the said court, until the first day of February, 1882. (*Not printed.*)
- No. 68a. Return to Address; Return of all correspondence between the Judge or Judges of the Maritime Court of Ontario and the Government, respecting the rules, &c., of said court, and the simplification thereof; also, copies of any amended or proposed amended rules, since 1st January, 1882. (*Not printed.*)
- No. 69... CANADA CENTRAL RAILWAY—PEMBROKE BONUS:—Return to Address; Copies of all correspondence upon the subject of the assumption by the Government of the payment of the amount granted by the Town of Pembroke, in aid of the Canada Central Railway.

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- No. 70... CONSTITUTIONS OF C.B., N.S., P.E.I., N.B., B.C., AND VANCOUVER ISLAND:—Return to Address; Copies of the charters or constitutions granted by the Crown or the Imperial Parliament, to the Provinces of Cape Breton, Nova Scotia, Prince Edward Island, New Brunswick, British Columbia and Vancouver Island; also, copies of all Acts, Charters, Royal Instructions, Commissions, Orders in Council or Despatches altering or amending the same, as originally granted, or conferring or withdrawing any political rights, or privileges, before or after the granting of such charters.
- No. 71... STEAMSHIP COMMUNICATION WITH GERMANY:—Return to Order; Copies of all correspondence between any Member of the House of Commons, or other persons, and the Government, in relation to the establishment of direct steamship communication between Montreal, Quebec, St. John, N.B., Halifax, and German seaports.

- No. 72... **SAILORS' APPLICATION FOR RELEASE:**—Return to Address; Copies of all correspondence between the Secretary of State and the Departments of Marine and Fisheries and of Justice, concerning the application of divers sailors in the port of Quebec, praying for a release from confinement, and to return to sea, &c., at the request of R. Temple, Master of the British vessel *Genii*. (*Not printed.*)
- No. 73... **BRITISH CANADIAN LOAN AND INVESTMENT Co.:**—Return (Senate)—A list of shareholders, and also a statement of its affairs on 31st December, 1882. (*Not printed.*)
- No. 74... **SEMAPHORES, RIVER DU LOUP, AND BRANDY POTS:**—Return to Address; Copies of all correspondence in relation to the erection of Semaphores on the wharf at River du Loup, in the County of Temiscouata, and on the Brandy Pots. (*Not printed.*)
- No. 75... **WHARVES AT RIVER DU LOUP AND RIVIÈRE OUELLE:**—Return to Order; Copies of all Reports made up to this date, respecting the movement of the ice at the wharves at River du Loup and Rivière Ouelle. (*Not printed.*)
- No. 76... **GRAND TRUNK RAILWAY:**—Return to Address; Copy of all correspondence between the Government of Canada and the Company, in relation to the purchasing of bonds and shares of the Wellington, Grey and Bruce Railway; also, certain stocks and shares of the Hamilton and North-Western Railway Company, and of the St. Lawrence and Ottawa Railway Company; also, all copies of correspondence in relation to the purchase or sale of the North Shore Railway Company, &c. (*Not printed.*)
- No. 76a... Return to Order; Return of all accidents and casualties which have occurred on the Railway, or any of its branches or railways under its control, involving either loss of life or injury to person or property, &c. (*Not printed.*)
- No. 76b... Return to Order; Copy of all correspondence between the Company and the Government, in reference to the purchase or sale of the Rivière du Loup Branch of the said railway, now owned by the Government; also, any correspondence showing the manner in which the said Company have expended or proposed to expend the money so received; and also, all correspondence concerning the Government lien for the debt of £3,111,500, and accrued interest.
- No. 76c... Supplementary Return to the preceding.
- No. 77... **FIFTH GENERAL ELECTION:**—Report on the Dominion elections of 1882, and also each election held subsequently thereto up to date.
- No. 77a... Return to Order; Return showing all sums paid to defray expenses of the late Dominion elections, in the different electoral districts.
- No. 78... **HÉBERT, H., FRAUDULENT PRACTICES:**—Return to Order; Copies of any complaint against Hubert Hébert, Chief Station Master at Montmagny, in relation to a charge of fraudulent practices affirmed against him by P. B. Casgrain, Esq., Member for L'Islet. (*Not printed.*)
- No. 79... **WHARFAGE AT DIGBY, N.S.:**—Return to Order; Statement of the amount collected for wharfage at the public pier at Digby, for each year from 1879 to 1882, inclusive. (*Not printed.*)
- No. 80... **RUSSELL VS. THE QUEEN:**—Return to Address; Copies of the judgments in the case of Russell and the Queen, in the Supreme Court of Canada and the Privy Council, and of the judgments in any Provincial courts of superior jurisdiction, or in the Supreme Court of Canada, in all cases raising the right of a Provincial Legislature to pass laws affecting the number or character of persons licensed to sell intoxicating liquors, or the times of such sale.
- No. 81... **SHUSHWAP AND OKANAGAN CANAL:**—Return to Address; Copies of all correspondence, &c., in connection with the surveys made in 1882 for the construction of a canal between Lakes Shushwap and Okanagan, British Columbia.
- No. 82... **ORDNANCE LANDS AND NAVAL RESERVES:**—Return to Order; Statement showing the gross amount of receipts from the sale or leasing of Ordnance Lands or Naval Reserves, in Ontario, Quebec, New Brunswick and Nova Scotia, from 1st July, 1856, to 1st July, 1882, and the purpose to which the sums so received have been applied; also a Statement showing the several properties of which portions have been sold or leased, and the number of acres in each case. (*Not printed.*)
- No. 82a... Supplementary Return to the preceding.

- No. 83... MURRAY CANAL:—Return to Address (Senate); Copies of all tenders received for the construction of the Murray Canal, and all correspondence, &c., concerning the same.
- No. 84... LAND FOR COLONIZATION:—Return to Order; Returns showing the total number of applications for land for colonization under plans Nos. 1 and 2 of the Land Regulations of 23rd December, 1881, up to 1st January, 1883, with the names of the applicants, the date of application, and the quantity of land in each case applied for.
- No. 85... O'CONNOR, HON. JOHN:—Return to Address; Statement of any sums paid, and the arrangement on which such were paid, to the Hon. John O'Connor, since his retirement from office. (*Not printed.*)
- No. 86... PRINCE EDWARD ISLAND RAILWAY:—Return to Order; Return of all reports, estimated cost, &c., bearing upon the survey of a proposed branch line of railway, between Harmony Station on the railway, to Elmira, east point of P.E.I.
- No. 87... BUOYS AND BEACONS, LAKE HURON:—Return to Order; Return of all correspondence with the Government within the past four years, copies of contracts and expenditure, in reference to buoys and beacons in the north channel of Lake Huron. (*Not printed.*)
- No. 88... TROOPS IN HALIFAX:—Return to Address; Copies of all despatches, Orders in Council and reports on the subject of the withdrawal of the troops from Halifax. (*Not printed.*)
- No. 89... COMMERCIAL RELATIONS WITH FRANCE, SPAIN, &c.:—Return to Address; Copies of all despatches, &c., between the Governments of the United Kingdom and Canada; and between the Government of Canada and the High Commissioner, touching negotiations for commercial arrangements with France, Spain or other countries.
- No. 90... LAKE ST. JOHN RAILWAY:—Return to Order; Copies of all correspondence between the Government and the Lake St. John Railway Company, in relation to the subsidy granted to the said company, and a statement of all sums paid to the said company, on account of the said subsidy. (*Not printed.*)
- No. 91... CUSTOM DUTIES REFUNDED AT TORONTO:—Return to Order; Return of the names and respective amounts of Customs duties refunded at the port of Toronto for the last fiscal year, and the articles or commodities upon which the duties were collected and refunded. (*Not printed.*)
- No. 92... IMPORTS AND EXPORTS:—Return to Order; Return showing the imports and exports from July 1st, 1882, to January 1st, 1883, and the countries from which imported and to which exported. (*Not printed.*)
- No. 93... IMMIGRATION:—Return to Address; Copies of all correspondence, &c., of recent date between the Governments of the Dominion and British Columbia, on immigration into that Province.
- No. 93a... Return to Order; Copies of all correspondence between the British Columbia and Dominion Governments respecting immigration to British Columbia; also, on the question of Chinese immigration.
- No. 93b... Return to Order; Return giving the number of Immigrant Agents (other than those on the regular and published lists) sent from Canada to Europe, who received pay from the Government during the Calendar years of 1881 and 1882; the names of persons so employed; the instructions given to them, &c.
- No. 93c... Return to Order; Copies of all correspondence, &c., in reference to the immigration of Jewish refugees from Russia into Canada, and the subsequent maintenance and disposal of such immigrants. (*Not printed.*)
- No. 94... QUEBEC PROVINCIAL SUBSIDY:—Return to Address; Copy of any representation by the Legislature of Quebec, on the subject of an increase of the provincial subsidy.
- No. 94a... Return to Address (Senate); All letters, correspondence, &c., which the Federal Authorities may have received from the Quebec Government or Legislature, asking for "better terms" or an increase of the Dominion Subsidy.

- No. 95... **ONTARIO BOUNDARY AWARD**:—Return to Address; Copies of all correspondence between the Secretary of State and Lieutenant-Governor of the Province of Ontario, in relation to the award respecting the northern and north-western boundaries of that Province, not already communicated.
- No. 96... **PORTAGE ISLAND**:—Return to Address; Copies of all correspondence between the Canadian Government and the British Government, in reference to the transfer of Portage Island, at the entrance of the Miramichi River, to the Government of Canada, together with all reports, &c., in reference to that subject.
- No. 97... **STEAMER TO REPLACE THE "GLENDON"**:—Return to Order; Return of the advertisement for the contract of the building of a steamer to replace the "Glendon"; the several tenders therefor, to whom the contract was awarded, and the amount of such contract. (*Not printed.*)
- No. 98... **TRADE BETWEEN CANADA, WEST INDIES AND BRAZIL**:—Return to Order; Copy of the petition relative to the trade between Canada and the West Indies, and Brazil, signed by the principal fish merchants of the coast of Gaspé and Bay des Chaleurs, and addressed to the Hon. Minister of Finance, with a copy of the letter accompanying the said petition.
- No. 99... **CARTRIDGE FACTORY AT QUEBEC**:—Return to Order; Return showing the cost of the cartridge factory at Quebec, since its establishment, and the names and salary of all the officers and employes, with the value and quantity of ammunition manufactured. (*Not printed.*)
- No. 100. **GRAIN AND PRODUCTS OF GRAIN**:—Return to Order; Statement showing:—1st. The amount of duties collected between 15th March, 1879, and 1st January, 1883, on the cereals comprised under the head of "grain and products of grain"; also the total quantities imported. 2nd. The quantity imported and entered for consumption in Canada; also quantity exported during the years 1874 to 1882, inclusive.
- No. 101. **S.S. "NEWFIELD" AND "MORAVIAN"**:—Return to Order; Copies of all correspondence with the Minister of Marine and Fisheries concerning the employment of the Government steamer "Newfield" in aiding the wrecked steamship "Moravian." (*Not printed.*)
- No. 102. **MINING REGULATIONS**:—Copy of those governing the disposal of mineral lands other than coal lands. (*Not printed.*)
- No. 103. **AGRICULTURAL IMPLEMENTS, &c., IMPORTED INTO MAN. AND N.-W.T.**:—Return to Order; Statement of agricultural implements, waggons, sleighs and carriages, imported from 30th June to 31st December, 1882.
- No. 103a. Return to Order; Statement of all agricultural implements, carriages, waggons and sleighs shipped, in bond, to Manitoba from other Provinces of the Dominion, from 1st July to 31st December, 1882.
- No. 103b. Return to Order; Statement of all agricultural implements, carriages, waggons and sleighs shipped, in bond, to Manitoba from other Provinces of the Dominion, during the fiscal year ended 30th June, 1882.
- No. 104. **HUDSON BAY**:—Return to Address; Return of all information in reference to the duration of navigation, the soundings and the extent to which the Bay freezes over; also, all documents bearing on its probable resources; also, all reports on the mineral resources of the regions about the Bay and the Islands therein.
- No. 105. **GRENVILLE AND CARILLON CANAL**:—Return to Order; Copy of the award of arbitrator on claim for damages put in by the contractor for the Grenville and Carillon Canal, under contract in force in 1871-72, with statement of sums paid thereunder.
- No. 105a. Papers in relation to the construction of two locks, and other works, at Greece's Point.
- No. 105b. Award of John Page, Esq., Chief Engineer, on the claim of Messrs. Heney, Stewart & Co., contractors for works at Greece's Point.
- No. 105c. Report of J. Page, Esq., Chief Engineer, on the Rapide Plat Canal.

- No. 106. **H. M. SHIPS ON BRITISH COLUMBIA COAST**:—Return to Address (Senate); Copies of all correspondence between the Dominion and Imperial Governments, and between the Dominion and British Columbia Governments, on the subject of having one or more of Her Majesty's ships of war stationed continuously on the coast of British Columbia. (*Not printed.*)
- No. 107. **GOVERNMENT SURVEY, LOT NO. 133, MANITOBA**:—Return to Address (Senate); Copies of all correspondence between the Department of Crown Lands, at Winnipeg, or the Department of the Interior, and parties claiming lot No. 133 of the Government survey, or any right thereto, situated in the Parish of Ste. Agathe, County of Provencher, Manitoba; also, copies of all Orders in Council or of the Department of the Interior, relating to the said lot. (*Not printed.*)
- No. 108. **SUBSIDIES FOR MANITOBA**:—Return to Address; Copies of all correspondence, &c., since the commencement of last Session, in reference to subsidies or grants for Manitoba.
- No. 109. **PUBLIC DEBT INCURRED FOR RAILWAYS, CANALS, ETC.**:—Return to Order; Statement showing the amounts charged in the Public Debt Account of the Dominion of Canada, which were expended on railways, canals and navigation securities in British Columbia, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia proper, and Cape Breton Island, up to 1st July, 1882, &c.
- No. 110. **MCMILLAN, J. D., DISMISSAL OF**:—Return to Order; Copies of all correspondence, &c., relating to the dismissal of John D. McMillan from his office as Fishery Overseer, and the appointment in his place of David Baker. (*Not printed.*)
- No. 111. **PILOTS AND PILOTAGE, BRITISH COLUMBIA**:—Return to Order; Copies of all correspondence, &c., between the Government and the Pilotage authorities of British Columbia, or any other parties in that Province, on the subject of Pilots and Pilotage.
- No. 112. **LIFE-SAVING STATIONS**:—Return to Order; Copies of correspondence, &c., relative to the establishment and management of Life-saving stations on coast of Lake Ontario, or other waters, together with such other reports upon the construction and operation of Life-saving stations in other countries as may be in the possession of the Government. (*Not printed.*)
- No. 113. **FRONTENAC TERRACE, QUEBEC**:—Return to Address; Copies of all documents in relation to the granting by the Imperial Government to the Dominion Government, and by the latter to the Provincial Government, of various lands, and more particularly of the land on which is located Frontenac Terrace, in the City of Quebec. (*Not printed.*)
- No. 114. **LAKE OF THE WOODS AND RAINY LAKE**:—Papers in relation to the construction of steamers for Lake of the Woods and Rainy Lake. (*Not printed.*)
- No. 115. **DAUPHENÉE, JAMES, CLAIM OF**:—Return to Order; Copies of all petitions, &c., in reference to the claim of James Dauphenée, of Bridgewater, Lunenburg, for payment of claim for refund of expenses incurred by him in discharge of his duties as a Fishery Warden of that County. (*Not printed.*)
- No. 116. **ORDNANCE FOR CANADA**:—Return to Order; Copy of contract, correspondence, &c., in connection with the manufacture of great guns for the Government of Canada. (*Not printed.*)
- No. 117. **COLONIZATION GRANTS**:—Return to Order; Return giving every form of patent arrangement or agreement, &c., between Companies and the Government in regard to colonization grants.
- No. 118. **TIMBER AND MINING LICENSES IN DISPUTED TERRITORY, ONTARIO**:—Return to Address; Copies of all correspondence, Orders in Council and papers not already brought down, relating to the cutting of timber or to mining on lands within the territory now in dispute with Ontario; also, all correspondence, &c., and all permits and licenses granted to make timber ties, telegraph poles and saw logs, within the district of Rainy Lake and River, and Lake of the Woods and tributary streams.
- No. 119. **ADMINISTRATION OF JUSTICE, CLAIMS OF THE PROVINCES**:—Return to Address; Copies of correspondence, from 1st July, 1887, to date, between the Dominion and the Provincial Governments respecting the claims of each of the said Provincial Governments, for the repayment of sums expended by them on account of the Dominion for the administration of justice; also, a statement in detail of the claims settled.

- No. 120.. H. M. S. "CHARYBDIS":—Return to Order; Copies of all correspondence, expenditure and reports relating to the "Charybdis", not already brought down. (*Not printed.*)
- No. 121.. SUBSIDIES TO CERTAIN RAILWAYS:—Report to Council, 14th May, 1883, recommending the grant of a subsidy of \$3,200 per mile, for 12 miles, in all \$38,400, towards the construction of a line of railway between Petitcodiac and Havelock Corner, N.B.
 Proposed subsidy, \$3,200 per mile for 80 miles from Canso to Louisburg or Sydney, in all \$256,000, to the Great American and European Short Line Railway Company.
 Proposed subsidy, \$3,200 per mile for 49 miles, in all \$156,000, to the International Railway Company.
 Proposed subsidy, \$3,200 per mile for 36 miles, in all \$115,200, to the Caraquet Railway Company, N.B.
 Proposed subsidy, \$3,200 per mile, in all \$160,000, to the Gatineau Valley Railway Company.
 Proposed subsidy, \$3,200 per mile first 50-mile section out of St. Jerome, in all \$160,000, to the Montreal and Western Railway Company.
 Proposed subsidy, \$3,200 per mile for 28 miles, from Napanee to Tamworth, in all \$89,600, to the Napanee, Tamworth and Quebec Railway Company.
 Proposed subsidy, \$3,200 per mile for 25 miles, from St. Raymond to Lake St. John, in all \$80,000, to the Quebec and Lake St. John Railway Company.
 Proposed subsidy, \$3,200 per mile for 100 miles from Metapedia to Paspebiac, in all \$320,000, to the Baie des Chaleurs Railway Company.
 Proposed subsidy, \$3,200 per mile for 32 miles (from the Intercolonial Railway to Mr. Laggan's Mills), in all \$102,400, to the Miramichi Valley Railway Company.
 Proposed farther subsidy at the rate of \$6,000 per mile, or a further sum, in all of \$660,000, from Gravenhurst to Callander, 110 miles, to such Company as shall be approved by the Governor in Council.
- No. 122.. ST. JOHN RIVER, N.B.:—Return to Address (Senate); Copies of all reports, letters, &c., since 1878, between the Department of Public Works and Mr. J. A. Lyon, or any other person, in reference to the removal of obstructions in the St. John River, N.B. (*Not printed.*)
- No. 123.. MANITOBA INDIAN AGENCY:—Return to Order; Report, with evidence, on the condition and management of the Manitoba Indian Agency under J. A. N. Provencher, the Indian Superintendent of the Manitoba District, made by the Government Commission of Enquiry; also vouchers dated 25th June, 1875, for \$180; 25th June, 1875, for \$1,290; and 26th December, 1875, for \$600, signed by one Tremblay, &c. (*Not printed.*)
- No. 124.. TELEGRAM EXPENSES, DEPARTMENT OF PUBLIC WORKS:—Return to Order; Statement of the expenditure for each month elapsed for the current fiscal year, on telegrams charged to various works in the Department of Public Works, and a like statement from November, 1881, to 30th June, 1882, inclusive. (*Not printed.*)

GENERAL REPORT
OF THE
MINISTER OF PUBLIC WORKS

FROM
30th JUNE, 1867,
TO
1st JULY 1882
(IN TWO PARTS.)

PART I.

Printed by Order of Parliament.



OTTAWA:
PRINTED BY MACLEAN, ROGER & CO., WELLINGTON STREET.
1883.

INDEX

TO THE

GENERAL REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FIFTEEN YEARS

FROM

30TH JUNE, 1867,

TO

1ST JULY, 1882.

INDEX TO REPORT

OF THE

MINISTER OF PUBLIC WORKS.

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An Alphabetical Index to the various appendices of the Minister's Report will be found after the last appendix.

GENERAL REPORT
OF
SIR HECTOR L. LANGEVIN,
C. B., K. C. M. G.,
MINISTER OF PUBLIC WORKS
OF
CANADA,
FOR THE
FIFTEEN YEARS
FROM
30th JUNE, 1867,
TO
1st JULY. 1882.

GENERAL REPORT

OF THE

MINISTER OF PUBLIC WORKS,

FOR THE

FIFTEEN YEARS FROM 1ST JULY, 1867, TO 30TH JUNE, 1882.

To His Excellency the Right Honourable Sir John Douglas Sutherland Campbell, Marquis of Lorne, one of Her Majesty's Most Honourable Privy Council, Knight of the Most Ancient and Most Noble Order of the Thistle, and Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor-General of Canada and Vice-Admiral of the same.

MAY IT PLEASE YOUR EXCELLENCY,—

The 19th Section of the Act 31 Victoria, 1867, Chapter 12, provides that “the Minister shall make and submit to the Governor an Annual Report of all the works under his control, to be laid before both Houses of Parliament within twenty-one days from the commencement of each Session, showing the state of each work and the amounts received and expended in respect thereof, with such further information as may be requisite.”

In accordance with the above-mentioned section, the report containing a statement of the expenditure and a summary of the operations of this Department for the fiscal year ended on the 30th June, 1882, has been submitted to Your Excellency.

GENERAL REPORT.

But the work of the second decennial census of the Dominion of Canada being virtually completed, the time has been deemed proper to prepare, conjointly with the Annual Report, a General Report giving a statement of the expenses and general summaries of the operations of the Department from the 1st July, 1867, to the 30th June, 1882.

CONFEDERATED PROVINCES.

Eight Provinces now compose the Canadian Confederation. These are, in the order of the dates at which these Provinces were admitted to form part of it: The Province of Quebec (1867); the Province of Ontario (1867); New Brunswick (1867); Nova Scotia (1867); Manitoba (1870); the North-West Territories (1870); British Columbia (1871), and Prince Edward Island (1873).

By Act 39 Vic., Chap. 21, (1876) the District of Keewatin was created.

By an Order in Council, dated 8th May, 1882, four provisional districts have been formed in the North-West Territories, namely: the District of Assiniboia, the District of Saskatchewan, the District of Alberta, and the District of Athabasca. In these four districts the Department has already carried out certain public works, and will hereafter cause others to be executed. (See Order in Council of 8th May 1882, at end of volume, pages 1403, 1404).

LEGISLATION.

During this period of fifteen years (1867 to 1882), several Acts relating to the Public Works were adopted by the Federal Parliament. The list of them will be found in Appendix No. 37, pages 1028, 1031.

Two of these Acts relate especially to the Department of Public Works; they are:—

1st. Act respecting the Public Works of Canada, 31st Victoria, Chapter 12, 1867.

2nd. Act respecting the offices of Receiver-General and Minister of Public Works, 42nd Victoria, Chapter 7, 1879.

In accordance with the first of these Acts, the works and duties placed under the control of the Minister of Public Works, were classed as follows:—

1. Canals and other works on navigable rivers constructed by the Provincial Governments previous to the 1st July, 1867, were placed under the control of the Department of Public Works.

2. The Department of Public Works shall cause harbours and piers to be constructed with the authority of the Federal Parliament.

3. The construction of lighthouses was entrusted to the Department of Public Works, but the care of causing the rules respecting them to be observed, of lighting and of provisioning them, was left to the Department of Marine and Fisheries.

4. The slides and booms constructed by the Government to convey timber into navigable waters were placed under the control of the Department of Public Works.

5. The control of the larger part of the roads and bridges was transferred to the Local Governments, but the construction of the great highways of military and interprovincial communication was reserved to the Department of Public Works.

6. Several public buildings were transferred to the Local Governments on certain conditions, but the others, which remain in the possession of the Federal Government, are under the control of the Department of Public Works.

The control of the Provincial vessels was transferred to the Department of Marine and Fisheries.

That Act remained in force until 1879, and, during this period of twelve years, the Department of Public Works had the following works and structures under its control :—

Railways.

Canals.

Public Buildings.

Ports, Harbours, Rivers, Piers, etc.

Dredging.

Slides and Booms.

Military and Interprovincial Roads.

Telegraph Lines.

In 1879 the Department of Public Works was divided into two Departments. The following are the provisions of the above mentioned Act, establishing that division :—

Section 4.—The present Department of Public Works shall be divided into two Departments, to be presided over and managed by two Ministers; one of the said Ministers shall be designated as the “Minister of Railways and Canals” and the other as the “Minister of Public Works.”

Section 5.—“The Minister of Railways and Canals shall have the management, charge and direction of all railways and works and property appertaining or incident thereto, and of all canals and works and property appertaining or incident thereto, which are or may be, immediately before the coming into force of this Act, under the management and direction of the Department of Public Works, and to the same extent and under the same provisions, subject to those of this Act; and the Minister of Public Works shall have the management, charge and direction of all other public works and property which are or may be, at the time aforesaid, under the management and direction of the Department of Public Works, and to the same extent and under the same provisions, subject to those of this Act.”

According to the conditions of the preceding section, the Department of Public Works has, therefore, had under its control since 1879, the following works and structures :—

Public Buildings.

Ports, Harbours, Rivers, Piers, etc.

Dredging.

Slides and Booms.

Military and Interprovincial Roads.

Telegraph Lines.

STATEMENT OF EXPENDITURE.

Appendix No. 1 (pages 1—145) is a detailed statement of expenditure incurred for Public Works in each Province of the Dominion, from the 1st July, 1867, until the 30th June, 1882.

This statement covers two great periods, namely:—

1. The ten years elapsed from the 1st July, 1867, to the 30th June, 1877 (pages 1—75).
2. The five years elapsed from the 30th June, 1877, to the 30th June, 1882 (pages 76—145).

It is divided into seventeen chapters or headings, treating severally of the following works, etc.:—

1. Railways (pages 2—3 and pages 76—77);
2. Canals (pages 4—13 and pages 78—85);
3. Public Buildings (pages 14—33 and pages 86—103);
4. Ports, Harbours, and Breakwaters (pages 34—43 and 104—115);
5. Improvements in Rivers (pages 44—47 and pages 115—119);
6. Dredging (pages 48—51 and pages 118—123);
7. Slides and Booms (pages 50—57 and pages 122—127);
8. Roads and Bridges (pages 56—59 and pages 126—129);
9. Surveys (pages 60—61 and pages 136—137);
10. Arbitrations (pages 60—61 and pages 136—137);
11. Telegraph Lines (pages 60—61 and pages 128—133);
12. Lighthouses, etc., (pages 62—67 and pages 133—137);
13. Various expenditure (pages 66—67 and pages 136—137);
14. Amounts contributed by municipalities for certain Public Works (pages 69 and pages 138—139);
15. Comparative statement of expenditure made for the different Public Works (pages 70—71 and pages 140—141);
16. General abstract of expenditure on Public Works, showing amounts expended in each Province (pages 72—73 and pages 142—143);
17. Expenditure on account of works authorized by special Acts of Parliament (pages 74—75 and pages 144—145).

RAILWAYS.

The Railways and Canals of the Government being no longer under the control of the Department of Public Works since 1879, it will suffice briefly to enumerate those of which it had the management and control until the preceding date.

According to the British North America Act, 1867, the railways belonging to the Provinces of Nova Scotia and New Brunswick, were transferred to the Government of Canada, which has managed them since that time.

For the details of expenditure and receipts, see Appendix No. 1, pages 2, 3, 72, 73, 76, 77, and also Appendices Nos. 42, 43.

INTERCOLONIAL RAILWAY.

By virtue of the provisions of the Act, 31 Vic., chap. 13, a commission was appointed, by an Order in Council, dated the 11th December, 1868, to construct and take the management of the Intercolonial Railway.

The whole line was opened to traffic on the 1st of July, 1876, and the Government has managed it since that time. For the details of expenditure and receipts, see Appendix No. 1, pages 2, 3, 72, 73, 76, 77, and also Appendices Nos. 42, 43.

COMMUNICATION WITH THE NORTH-WEST AND CANADIAN PACIFIC RAILWAY.

In consideration of the annexation, then in contemplation, of the North-West Territories, the Government of the United Provinces of Upper and Lower Canada caused surveys to be made with the object of deciding upon the best means of establishing a direct line of communication between Lake Superior and those Territories. With the information obtained from all those surveys, a line of communication by land and by water was chosen in 1868, extending from Fort William on Lake Superior, to Fort Garry on Red River.

Works of improvement were made on this line between that time and 1879, when the construction of the Canadian Pacific Railway was practically decided on. See Appendix No. 19, pages 646 to 649, and Appendix No. 30—Part I, pages 825 to 827.

Parties of surveyors formed to decide upon the most favorable route for the construction of a railway built on Canadian territory, and terminating at the Pacific Ocean, began their labors in June, 1871, and the report of the Chief Engineer of the survey was submitted to Parliament in the following year.

Since that time, those surveys were continued every year, and the Government, in 1875, caused works to be begun, which were continued till 1880.

In 1881, the Federal Parliament adopted the Act relating to the Canadian Pacific Railway, 44 Vic., chap. 1, (sanctioned on the 15th February of the same year). Ac-

According to the terms of that Act and on the conditions therein specified, the Canadian Pacific Railway Company undertakes to construct all the line. For the details of expenditure and receipts, see Appendix No. 1, pages 2, 3, 72, 73, 76, 77, and also Appendices Nos. 42, 43.

PRINCE EDWARD ISLAND RAILWAY.

This line was transferred to the Federal Government at the time of the admission of Prince Edward Island into the Confederation (1st July, 1873). The Federal Government caused the line to be completed, opened it for traffic on the 1st of April, 1875, and has managed it since that time. For the details of expenditure and receipts, see Appendix No. 1, pages 2, 3, 72, 73, 76, 77, and also Appendices Nos. 42, 43.

COST OF CONSTRUCTION.

The Government expenditure on construction of railways up to 30th June, 1882, amounts to \$90,729,662.48, subdivided as follows:—

Government Railways:—

Prior to Confederation.....	\$13,881,460 65
Since do	55,491,071 82
	<hr/> \$69,372,532 47

Subsidized Railways:—

Prior to Confederation.....	\$20,264,800 01
Since do	1,092,330 00
	<hr/> \$21,357,130 01

Total	<hr/> \$90,729,662 48
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See Appendix No. 43.

For details respecting Canadian Railways, see Part IV of Appendix No. 30.

CANALS.

The Canals of Canada have been constructed for the purpose of overcoming the natural obstructions which have existed on the following routes of inland navigation namely:—

1. The St. Peter's Canal.
2. The Richelieu and Lake Champlain navigation.
3. The St. Lawrence navigation.
4. The Montreal and Kingston, *via* the Ottawa.
5. The Upper Ottawa navigation.
6. The navigation of the River Trent and Newcastle District.

7. The navigation of the rivers and lakes on the Dawson route between Prince Arthur's Landing, Thunder Bay, on the north shore of Lake Superior, and the north-west angle of the Lake of the Woods.

See tabulated profiles describing each route in Part I. of Appendix No. 30.

See also Appendix No. 31, for opening and closing of Navigation on each route.

ST. PETER'S CANAL.

This Canal unites St. Peter's Bay on the shore of Cape Breton, Nova Scotia, with the lakes of the Bras d'Or. It cuts through an isthmus half a mile in length and runs into the Atlantic Ocean. For details, see statement No. 4 of Appendix No. 30, Part I, at page 799.

THE RICHELIEU AND LAKE CHAMPLAIN NAVIGATION.

This line of navigation extends from Sorel, at the mouth of the River Richelieu, a point 46 miles below Montreal, and 114 miles above Quebec, as far as the head of Lake Champlain; from the latter point, the line is prolonged by the Champlain Canal and the Hudson River, as far as New York, 457 miles from Montreal.

The Canadian Canals on this route are, in ascending order, the St. Ours and the Chambly.

ST. OURS CANAL.

The St. Ours Canal consists of a lock 200 feet in length, and 45 feet in breadth, with 7 feet of water on the sills, and extension piers above and below the lock, together with a dam across the Richelieu, 14 miles above Sorel.

CHAMBLY CANAL.

The Chambly Canal is 12 miles in length; it extends from the village of Chambly to the city of St. John's, 104 miles above Montreal, and comprises 9 locks of $118 \times 23\frac{1}{2}$ feet, with 7 feet of water on the sills. The breadth of the canal at bottom is 60 feet.

CHAMPLAIN CANAL.

The Champlain Canal commences at Whitehall, 238 miles from Montreal, connects with the Erie Canal which terminates at Albany, 311 miles from Montreal; it comprises 23 locks, 100×18 feet, with 5 feet of water on the sills. The breadth of the canal at bottom is 50 feet. The Champlain and Erie Canals are in the State of New York.

For further details respecting expenditure and description of route, see Appendix No. 1, and statements 12, 13, of Appendix No. 30, Part 1, pages 810 to 813.

THE ST. LAWRENCE NAVIGATION.

The Canals on this route are those of Lachine, Beauharnois, Cornwall, Farran's Point, Rapide Plat, Galops, Murray, Burlington Bay and Welland.

The length of each canal, the number and dimensions of the locks, the depth of water on the lock sills, the length of the navigable reaches between the canals and the navigable draught of water throughout, are shown in statements 1 to 12 of Appendix No. 30, Part I, pages 796 to 810.

For details respecting expenditure, see Appendix No. 1.

LACHINE CANAL.

The Lachine Canal extends from the city of Montreal as far as the village of Lachine, and enables vessels to avoid the St. Louis Rapids, the first rapids which prevent the ascending of the River St. Lawrence, a distance of 986 miles from the Strait of Belle-Ile.

BEAUHARNOIS CANAL.

The Beauharnois Canal is situated on the south shore of the St. Lawrence, 15½ miles from the head of the Lachine Canal, and extends into the land for a distance of 11½ miles, uniting the Lakes St. Louis and St. Francis, and thus avoiding the Cascades, Cedars and Côteau Rapids.

CORNWALL CANAL.

The Cornwall Canal enables vessels ascending the River St. Lawrence to avoid the Long Sault Rapids. There is a distance of 32¾ miles, on Lake St. Francis, between the head of the Beauharnois Canal and the Cornwall Canal.

FARRAN'S POINT CANAL.

The Farran's Point Canal enables vessels ascending the river to avoid the Farran's Point Rapids; descending vessels can shoot these rapids with ease and in perfect safety. From the head of the Cornwall Canal, to the lower end of that of Farran's Point, the distance upon the St. Lawrence is 5 miles.

RAPIDE PLAT CANAL.

The Rapide Plat Canal enables vessels ascending the river to avoid the Flat Rapids; those descending can shoot these rapids without danger. There is a navigable channel of ten and a half miles between the head of the Farran's Point Canal and the Flat Rapids.

GALOPS CANAL.

The Galops Canal enables vessels to avoid the rapids of Pointe aux Iroquois, Pointe à Cardinal and the Galops. From the head of the Rapide Plat Canal to the foot of that of the Galops, the St. Lawrence is navigable for a distance of $4\frac{1}{2}$ miles.

MURRAY CANAL.

The opening of a canal $6\frac{1}{2}$ miles in length, and with 11 feet in depth of water, uniting the head of the Bay of Quinté with Lake Ontario, has been authorized by Parliament; the line has been decided upon and the works are in course of execution. There is no lock on this canal. See Appendix No. 30, Part I, of this report, and also pages 45 to 47 of General Report of 1867. See also Report on Railways and Canals, 1882, at page 40.

BURLINGTON BAY CANAL.

Burlington Bay Canal, mentioned here in geographical order, is only a single cut through a sand bank which has formed between Lake Ontario and Burlington Bay, and is navigable for vessels drawing ten feet of water. It enables vessels to reach the port of Hamilton, and afterwards the town of Dundas, by way of the Desjardins Canal. For details see Appendix No. 30, Part I, of this report, and also pages 34 and 35 of the General Report of the Commissioner of Public Works, published in 1867.

WELLAND CANAL.

The Welland Canal connects Port Dalhousie on Lake Ontario, with Port Colborne on Lake Erie; it is $26\frac{3}{4}$ miles in length, and is fed by Lake Erie and by the Grand River. It has a total rise or lockage of $326\frac{3}{4}$ feet, and 26 locks. For details see Appendix No. 30, Part I, of this Report, and also pages 24 to 34 of the General Report published in 1867. See also report of Chief Engineer of Canals, 1880.

MONTREAL, OTTAWA AND KINGSTON NAVIGATION.

Upon this line of navigation are the St. Anne, Carillon, Châte à Blondeau, Grenville and Rideau Canals.

For details see Statement No. 14 of Appendix No. 30, Part I, pages 814 to 817.

STE. ANNE CANAL.

The Ste. Anne Canal, known as the Ste. Anne Lock, enables vessels to overcome the rapids at the village of St. Anne, between Ile Perrot and the head of the Island of Montreal; this lock is situated at a short distance below the portion of the River Ottawa which forms the Lake of Two Mountains, and is about $23\frac{1}{2}$ miles above the port of Montreal.

A new lock is now in course of construction, and will shortly be completed at Ste. Anne.

The least depth of water on the sills will be nine feet.

CARILLON CANAL.

The Carillon Canal enables vessels to avoid the rapids of that name. Between Ste. Anne Lock and the Carillon Canal there is a navigable channel of 27 miles on the Lake of Two Mountains and the River Ottawa. Since the date of the last General Report of 1867, a new canal three-quarters of a mile in length, with two locks, has been built; at the upper end of the canal a dam has been also constructed across the River Ottawa, in order to raise the water between the Carillon and the Grenville Canals; on the south side of the river there is a slide through the dam for the passage of timber.

CHUTE A BLONDEAU CANAL.

The Chûte à Blondeau Canal is cut through the solid rock. There is only one lock, and it is only used by vessels ascending the river; for in descending it, all pass through the rapids.

Since the new canal at Carillon and the dam across the Ottawa have been constructed, this canal has become almost useless. Between the Carillon and Chûte à Blondeau Canals the navigable channel is five and three-eighths miles long.

GRENVILLE CANAL.

The Grenville Canal is about 56 miles from the city of Ottawa, and enables vessels to avoid the Long Sault Rapids. This canal has been enlarged; three new locks at the upper end have been built, and two others at the lower end are in course of construction.

When the enlargement of the Ste. Anne, Carillon and Grenville Canals is fully completed, there will be eight new locks of 200 x 45 feet, and the depth of water on the sills and in the intermediate sections of the River Ottawa will be not less than nine feet during low water.

From the head of La Chûte à Blondeau as far as the foot of the Grenville Canal, the navigable channel is one mile and three-eighths in length.

RIDEAU CANAL.

The Rideau Canal unites the River Ottawa to the lower extremity of Lake Ontario, at Kingston, and is only a conversion of the Rideau and Cataraqui Rivers into a continuous navigable channel. The Rideau falls into the Ottawa and the other into the St. Lawrence. These two water-courses are united by a connecting reach

near their respective sources. The River Ottawa is navigable from the head of the Grenville Canal, as far as the foot of the Rideau Canal, city of Ottawa, a distance of 56 miles. On this line of navigation there are forty-seven locks of 134 x 34 feet; the depth of water is five feet on the lock sills and the navigable draught through the canal is four and a-half feet. For further details see tabulated profile No. 14 of Appendix No. 30, Part I, pages 816, 817.

For expenditure on each canal, see Appendix No. 1.

UPPER OTTAWA NAVIGATION.

Steamboat navigation on various portions of the river above the city of Ottawa extends as far as the mouth of the River Mattawan, a total distance of 192 miles, of which 120 miles, between Ottawa and the Joachim Rapids, are navigable for vessels of six feet draught of water, and 50 miles, between the Joachim Rapids and the mouth of the Mattawan, for vessels of from three and a half to two feet draught, during low water.

For details respecting this route, see statements Nos. 29 to 32 of Appendix No. 30, Part I, pages 838 to 847.

The principal obstructions to a continuous line of navigation are the rapids of:—

The Chats.....	33 miles above the city of Ottawa.		
Portage du Fort.....	55	"	"
Calumet.....	66	"	"
Joachim	143	"	"
Rocher Capitaine.....	160	"	"
Deux Rivières.....	170	"	"

The principal works undertaken or executed for the improvement of the navigation are the following:—

CHATS CANAL.

This canal was designed to connect the navigable waters of Lake Chaudière or Lac des Chênes with those of Lac des Chats, for vessels with a draught of 7 feet. The distance from the city of Ottawa to the Chats Canal is about 33 miles.

It was commenced in August, 1854, and discontinued on 15th November, 1856.

For expenditure see Appendix No. 1.

For details respecting work see Appendix No. 30, Part I, page 841, and the General Report of 1867, pages 79 to 82.

CULBUTE CANAL.

This canal connects navigation between the village of Bryson, at the head of the Great Calumet Falls, about 66 miles above the city of Ottawa, and the village of Aberdeen, at the foot of the Joachim Rapids, a total distance of 77 miles.

It comprises two combined locks of 200 x 45 feet each, with 6 feet of water on the sills.

The work was commenced in 1873 and completed in 1876.

Two submerged dams are now being constructed for the purpose of raising the water in the north channel of the Ottawa, from Bryson to Culbute.

One of the dams is in the north channel below Bryson, near the foot of Calumet Island; the other is in the south channel towards the head of the same Island.

For details respecting work and cost of the same see Appendices Nos. 1 and 30.

THE NAVIGATION OF THE RIVER TRENT AND NEWCASTLE DISTRICT.

The River Trent falls into the Bay of Quinté, Lake Ontario, at Trenton, 67 miles above Kingston.

Ascending from Lake Ontario to Lake Scugog we meet with the following rivers and lakes:—

Bay of Quinté, River Trent, Rice Lake, River Otonabee, Clear Lake, Buckhorn Lake, Pigeon Lake, Sturgeon Lake, River Scugog and Lake Scugog.

From the mouth of the Trent up to Port Perry at the head of Lake Scugog, the distance is 190 miles, and the total rise 570.27 feet.

The elevation of Lake Scugog above tide-water at Three Rivers, according to the levels given in statement No. 12, Appendix No. 30, is 810.27 feet.

The locks, dams and slides which have been constructed on the River Trent route are intended to improve navigation and facilitate the floating of timber.

From Trenton to Port Perry, $169\frac{1}{2}$ miles only are navigable and $29\frac{1}{2}$ are un-navigable.

The draught of water on this line of inland navigation, varies from four to five feet, the locks are 133 feet in length and 33 in breadth, the depth of water on the lock sills is five feet.

The navigation has lately been improved and is now being extended by the construction of a short canal and two locks at Fenelon Falls; the latter were commenced in 1882.

For details respecting this route, see tabulated profile, No. 15, in Appendix No. 30, Part I, pages 818 to 823.

NAVIGABLE WATERS ON THE DAWSON ROUTE, COMPRISING THE FORT FRANCES LOCK.

The Dawson Route extends from Prince Arthur's Landing, Thunder Bay, Lake Superior, to the city of Winnipeg, a total distance of 451 miles.

It comprises 147 miles of road and portages, and 304 miles of river and lake navigation with a draught of water not less than from 3 to 4 feet.

A description of this route will be found in Appendix No. 19, at pages 646 to 653, and in statements Nos. 17, 18, 19 of Appendix No. 30, Part I, pages 825 to 828.

FORT FRANCES LOCK.

This lock is situated near the outlet of Rainy Lake, at a distance of 237 miles north-westward from Prince Arthur's Landing and 215 miles south-eastward from Fort Garry, (Winnipeg), *via* the Dawson Route.

The object sought by the construction of this work was to connect the navigation from Kettle Falls, at the head of Rainy Lake, with that of the Lake of the Woods as far as the north-west angle of that lake, a distance of 164 miles, for vessels of 7 feet draught of water.

The lock was commenced on the 14th June, 1875, and completed in 1879, with the exception of the gates.

The works requisite to obtain a navigable draught of 7 feet throughout, have not been carried out.

Appendix No. 30, Part I, contains a full description of this work, and shows the cost of the works executed, at pages 826, 827.

ENLARGEMENT OF CANALS.

The report of 1871 mentions the appointment, under the Great Seal of Canada, under date 16th November, 1870, of a commission charged to make inquiries into the best means of improving our canal system. On the 21st February, 1871, the commission addressed to the Secretary of State a report containing its recommendations in this respect. That report was published.

Since 1871, Parliament has voted each year the sums necessary to carry out the recommendations contained in that report.

Long and minute surveys and examinations have been made to decide the dimensions of the enlarged canals, of the locks, etc., etc., and the work of enlargement has been in course of execution since 1873.

ENLARGEMENT ON THE ST. LAWRENCE ROUTE.

In 1871 the scale of navigation on the St. Lawrence route was fixed throughout at a depth of 12 feet of water, instead of 9 feet in the Lachine, Beauharnois, Cornwall, Farran's Point, Rapide Plat and Galops Canals, and instead of 10½ feet in the Welland Canal. The dimensions of the locks were fixed at 270 feet between the gates and at 45 feet in width, instead of 200 x 45. The least breadth of the canals at bottom was fixed at 100 feet.

In 1873 the enlargement was authorized to be carried out on this scale, upon the Lachine and Welland Canals, and subsequently on the Cornwall Canal.

In the early part of 1875 the Government gave orders to place the foundations of all permanent structures on those parts of the works not then under contract at a depth corresponding to 14 feet of water on the mitre sills of the locks.

The works on the Lachine, Cornwall and Welland Canals have been proceeded with in accordance with these directions.

The enlargement of the Lachine Canal is expected to be completed this year.

On the Cornwall, the two lower locks have been completed; the enlargement at the upper end will probably be commenced in the course of the present year.

On the Welland Canal, the works of enlargement are nearly completed for a draught of 12 feet of water, excepting at the point where the canal is carried by an aqueduct over the Chippewa River, where the draught is limited for the present to $11\frac{1}{2}$ feet for vessels using their own motive power; the draught of vessels in tow, however, may be 12 feet.

For details respecting the enlargement of the St. Lawrence Canals, see the Report of the Chief Engineer of Canals, dated 16th February, 1880, and published the same year.

ENLARGEMENT ON THE MONTREAL AND OTTAWA ROUTE.

According to the scale of navigation adopted for the portion of the route between Montreal and Ottawa, the dimensions of the new locks of the Ste. Anne, Carillon and Grenville Canals, have been fixed at 200 x 45 feet, the depth of water on the sills at 9 feet, and in the canals at 10 feet.

The smallest dimensions of the old locks are 190 x 45 feet at Ste. Anne, $126\frac{1}{2}$ x $32\frac{1}{2}$ on the Carillon Canal, $130\frac{1}{2}$ x $32\frac{1}{2}$ on the Châte à Blondeau Canal, $106\frac{1}{2}$ x 19 on the Grenville Canal, and the depth of water on the sills of the locks throughout is 6 feet.

The new locks at Ste. Anne, and the two new locks at the foot of the Grenville Canal, will probably be completed during the present year.

The scale of navigation on the Rideau Canal has not been altered; the locks are 134 feet in length and 33 feet in breadth; the depth of water is 5 feet on the lock sills, and the navigable depth through the canal, only $4\frac{1}{2}$ feet.

DIMENSIONS OF VESSELS.

The dimensions of vessels capable of passing through the St. Peter's, St. Lawrence, Sault Ste. Marie, Richelieu, Champlain, Erie, Ottawa and Rideau Canals, are shown, together with the size of the smallest locks and the navigable draught of water, in Statement No. 16, of Appendix No. 30, Part 1, page 824.

OPENING AND CLOSING OF NAVIGATION.

The opening and closing of navigation on the different routes above described, and on the Champlain, Erie and Sault Ste. Marie Canals, are given in Appendix No. 31, from the time they were first recorded up to the present year, so far as it was possible to ascertain them.

COST OF CONSTRUCTION.

The total cost of construction of all the canals, from their commencement to the 30th June, 1882, amounts to \$48,410,983.42.

Sub-divided as follows, viz. :—

Government expenditure—

Prior to Confederation.....	\$18,797,913 90	
Since do	23,447,564 27	
	—————	\$42,245,478 17

Other than Government expenditure—

Prior to Confederation.....	\$4,459,664 67	
Since do	1,705,840 58	
	—————	6,165,505 25

Total..... \$48,410,983 42

For details respecting cost of construction and revenue, see Appendices Nos 1 and 42, 43.

PROJECTED CANALS.

Besides the canals above enumerated, the following are still prospective:—

BAIE VERTE CANAL.

The Baie Verte Canal would cut the isthmus which divides Cumberland Basin, at the head of the Bay of Fundy, from the Baie Verte, on the Gulf of St. Lawrence. It has been the subject of special reports: in 1872, by Mr. G. F. Baillairgé; in 1873, by Messrs. Keefer, Gzowski and Page; in 1876, by a commission composed of the Honorable John Young, president; the Honorable W. P. Howland, C.B., and Messrs. J. W. Lawrence and Peter Jack. See Appendix No. 30, pages 830 to 833.

There is at present a proposition to substitute for a canal a railway for marine transport, and a Company has been incorporated for the construction of the railway.

CEDARS CANAL.

Surveys were made in 1873-74 and 1875-76 on the north shore of the St. Lawrence, between Lakes St. Louis and St. Francis, in order to determine the pro-

bable cost of a canal according to the scale of navigation recommended by the Canal Commissioners in 1871, viz.: Locks, 270 x 45 feet, with 12 feet of water on the sills; bottom width of canal, 100 feet.

Surveys were also made from 1874 to 1876 on the south shore, in order to ascertain the probable cost of enlarging the Beauharnois Canal to the same dimensions.

The reports and estimates in both cases are under the consideration of the Department of Railways and Canals.

For further details in connection with Cedars Canal survey, see Appendix No. 30, Part I, pages 835, 836.

TAY CANAL.

A description of the improvements contemplated in connection with this canal, will be found in Appendix No. 30, at page 837, and in the Report of the Minister of Railways and Canals for 1881-82, page 34.

OTTAWA SHIP CANAL, MONTREAL TO LAKE HURON VIA LAKE NIPISSING AND FRENCH RIVER.

Surveys were made in connection with this projected work by Walter Shanly, C.E., in 1857, and T. C. Clarke, in 1859. See Appendix No. 30, pages 838 to 847.

Reports and estimates were furnished by each of these Engineers; they are fully explained in the General Report of 1867, at pages 79 to 83.

ST. LAWRENCE AND LAKE CHAMPLAIN PROJECTED CANAL.

From 1847 to 1856 various lines were surveyed and reported on by Messrs. Mills, Jarvis, Gamble and Swift, Civil Engineers, in connection with this projected work, from Longueuil (opposite Montreal), from Caughnawaga, Lake St. Louis, and a point on the Beauharnois Canal,—to Lake Champlain.

The line recommended by Mr. J. B. Mills in his report dated the 19th February, 1848, and subsequently approved by Messrs. Gamble and Swift, extended from Caughnawaga (opposite Lachine) to the Chambly Canal, which it was proposed to enlarge for a distance of $8\frac{7}{8}$ miles up to the port of St. John's, which was selected as the proper terminus on Lake Champlain. The total length of this line, including the $8\frac{7}{8}$ miles of the Chambly Canal to be enlarged, is $32\frac{1}{2}$ miles. The locks were designed to be 200 x 45 feet, with nine feet of water on the sills, and the canal was to be supplied by water from Lake Champlain.

Mr. Mills estimated the probable cost of the work at \$1,814,408.

Mr. J. B. Jarvis, in a report dated 13th February, 1855, proposed a canal with entrances at Caughnawaga and St. John, and a navigable feeder from the Beauhar

nois Canal with a summit level of $37\frac{1}{2}$ feet above Lake Champlain. The locks were to be 230 x 36, with ten feet of water on the sills.

He estimated the cost of the work at \$4,267,890.

For further details see General Report of 1867, pages 68 to 70.

For details respecting distances, number and size of canals, draught of water proposed, and probable cost, see tabular statements and memoranda, Nos. 29 to 31, in Appendix No. 30, Part I.

Appendix No 30 herein referred to, contains tabulated profiles and memoranda respecting the inland navigation of Canada and its connections, the ocean routes thence to foreign countries, the Canadian inter-provincial highways and land routes to the seaboard, the Government railways and telegraph lines, the railway mail routes of Canada, and also the principal overland mail routes and lines of railway and water communication in Manitoba, the North-West Territories and British Columbia. This Appendix has been registered as No. 33859 in the Record Office of the Department.

PUBLIC BUILDINGS.

The Dominion Government possesses Public Buildings in all the Provinces which form the Confederation. These buildings may be classed as follows:—

Parliament Buildings and Governors' Residences,
Custom Houses,
Examining Warehouses and Inland Revenue Offices,
Post Offices,
Penitentiaries and Prisons,
Quarantine Stations and Immigrant Sheds,
Marine Hospitals,
Military Buildings and Drill Sheds,
Observatories and Museums.

PROVINCE OF NOVA SCOTIA.

CUSTOM HOUSES, INLAND REVENUE AND POST OFFICES.

The Dominion Government possesses Custom Houses at Halifax and at Pictou. At Halifax, the offices of Inland Revenue and of the Receiver-General, as well as the Provincial Museum, are located in the same building as those of the Customs.

At Pictou, the offices of Weights and Measures, of the Marine and of Inland Revenue, are also placed in the same building as those of the Customs.

PENITENTIARY.

The Federal Government having established the Penitentiary for the Maritime Provinces at Dorchester, N.B., the old Penitentiary is no longer used as a prison.

QUARANTINE STATIONS.

The Federal Government has three establishments of this nature in Nova Scotia, in the following towns and localities, viz.: Lawlor's Island near Halifax, Pictou, and Bunker's Island at Yarmouth.

MARINE HOSPITALS.

These are situated at Lunenburg and Bunker's Island, and another is to be built at Pictou.

DRILL SHEDS.

The Government possesses Drill Sheds at Halifax, Lunenburg, Belltown, Windsor, River Philip, Amherst, and Maccan on the Hébert River.

For a description of these Public Buildings see Appendix No. 2, pages 148-150.

PROVINCE OF PRINCE EDWARD ISLAND.

The Post Office, the Custom House and the Savings Bank are placed at Charlottetown, in the building where the Provincial Government Offices were installed before the entrance of the Province into the Confederation; there is also a Quarantine Station at Southport.

The Marine Hospital is at Souris.

There are Drill Sheds at Charlottetown and Georgetown (Appendix No. 2, pages 150-151.)

PROVINCE OF NEW BRUNSWICK

CUSTOM HOUSES, AND POST OFFICES, ETC.

The Federal Government is in possession of Custom Houses at Fredericton, St. John, Chatham, Miramichi and Newcastle. In the greater number of these buildings, other offices of the Federal Government are also placed.

PENITENTIARIES.

In 1876 the Federal Government resolved to close all the Penitentiaries throughout the Maritime Provinces, and to replace them by a single establishment built in a central position. The choice fell upon Dorchester, N.B. The Penitentiary for the Maritime Provinces is erected upon a ground plot of 619 acres, situated three-quarters of a mile from Dorchester Corners, upon the road leading to Memramcook. It is a stone building, all the partition walls of which are brick, except in the cells where

they are stone. The offices are located in the main building. The construction of it was begun in 1876. The prisoners are lodged in a cell wing of the building which contains 120 cells. Another wing is being built with 200 cells. Each of the Keepers has his residence on the land surrounding the Penitentiary; here also are erected the workshops, the bakery, &c. (See the complete description in Appendix No. 2, Pages 156, 157.)

The establishment was completed and occupied in 1878-79, and additions were made to it in 1880-81.

The Federal Government also possesses a Prison at St. John, which was the old Provincial Prison, and was vacated after the completion of the Penitentiary at Dorchester.

QUARANTINE STATIONS.

The Dominion Government possesses two in the Province; one is located at Partridge Island, near St. John, and the other at Middle Island, two miles below Chatham on the Miramichi River.

MARINE HOSPITALS.

One is now being built at St. John, on the site of the old hospital, a building which is falling into ruin. The Dominion Government has three others, severally located at St. Andrew's, Miramichi and Sackville.

MILITARY BUILDINGS.

The Dominion Government possesses military buildings at St. John, St. Andrew's and Fredericton. (Appendix No. 2, pages 151-158).

DRILL SHEDS.

These are at St. John and St. Andrew's.

PROVINCE OF QUEBEC.

CUSTOM HOUSES, INLAND REVENUE AND POST OFFICES.

The Dominion Government has Custom Houses in the following cities and places:—Quebec, Three Rivers, St. John's, St. Régis, Dundee and Montreal.

At St. Johns, the Post Office is located in the same building as the Customs.

In the other cities and localities above mentioned, these offices, as well as those of the Inland Revenue, and the Agencies of the Minister of Marine and the Receiver-General, are in separate buildings.

PENITENTIARIES.

The Provincial Penitentiary is erected at St. Vincent de Paul. It was described at length in the Report of 1867, but since that time considerable additions and

improvements have been made to it. Between five and six hundred prisoners can be lodged there. (See description, Appendix No. 2, pages 171-173.)

QUARANTINE STATION.

The only Quarantine Station in the Province of Quebec is situated at Grosse Ile, 33 miles below the city of Quebec.

IMMIGRANT SHEDS.

These are situated at Lévis, Sherbrooke and Montreal. The Immigrant Shed at Lévis was burnt in the autumn of 1882, but is to be rebuilt.

MARINE HOSPITALS.

The Dominion Government possesses two in the Province; one is located at Chicoutimi, the other at Quebec.

MILITARY BUILDINGS.

In 1856 and 1870-71-72, the English Government transferred nearly all the military buildings they possessed in Canada to the Canadian Government.

For Ordnance Property, including the Ottawa Canals, transferred by the Imperial to the Canadian Government, prior to 1st July, 1867, see Appendices Nos. 58 and 60, in General Report of 1867, pages 444 to 450, inclusive, and also Appendix No. 70 of same Report, pages 566 to 569, inclusive.

For Ordnance Property transferred and classified since 1st July, 1867, see Schedules for 1869, 1870-71, 1871-72, and 1879, recorded in Department of the Interior, as per Appendix No. 36½.

Those of the Province of Quebec are situated at Témiscouata, Lévis, Quebec, Three Rivers, Sorel, Chambly, St. John's, Ile aux Noix and Montreal, Laprairie, Casacades, Cedars, Coteau du Lac, etc.

DRILL SHEDS.

These are situated at Quebec, Montreal, Sherbrooke, Robinson of Compton County, St. Andrew's, Carillon and Cushing.

OBSERVATORY.

The Dominion Government possesses an Observatory at Quebec.

GEOLOGICAL MUSEUM.

The Geological Museum at Montreal was transferred to Ottawa, and the building sold to the Provincial Government. (See Appendix No. 2, pages 163-177.)

PROVINCE OF ONTARIO.
FEDERAL BUILDINGS AT OTTAWA.

PARLIAMENT BUILDINGS.

These Buildings were fully described in the Report of 1867. Since that time various additions and improvements have been made to them.

The Library was completed in 1877. The eastern and western blocks, where the offices of the several Ministers are located, have been improved, and the western block has been extended since 1867.

The grounds which surround these Buildings have also been laid out in a suitable manner. (See Appendix No. 2, pages 178—180.)

GOVERNMENT HOUSE—RIDEAU HALL.

The residence of the Governor General is located on the estate situated at New Edinburgh and purchased by the Government from the heirs McKay in 1867. Various improvements have since been made, viz.: the construction of a residence for the Secretary, a gate lodge, laundry, gasometer house, conservatory, vinery, skating rink, stables, outbuildings, fencing, drainage and water works. See Appendix No. 2, pages 180,181.

For description of works anterior to 1867, see Appendix No. 23 of General Report of that year.

SUPREME COURT.

The Supreme Court is held in the Government building at the western corner of Government Square. (Appendix No. 2, pages 179-180.)

FEDERAL BUILDINGS ELSEWHERE.

CUSTOM HOUSES, INLAND REVENUE AND POST OFFICES.

The Government has Custom Houses at Ottawa, Kingston, Belleville, Toronto, Hamilton, St. Catharines, Dalhousie, Brantford, Guelph, London and Windsor.

In the greater part of these buildings other Government offices are also located, such as the Post Offices, Inland Revenue, &c., &c. (See Appendix No. 2, pages 177—204.)

MILITARY BUILDINGS.

The Government possesses important military buildings at Prescott, Ottawa, Kingston, Toronto and Niagara. (See Appendix No. 2, pages 182—203.)

DRILL SHEDS.

There are 109 of these buildings in Ontario; they are generally constructed of wood; forty-three of them are eastward and sixty-six westward of Toronto. (See Appendix No. 2, pages 181—202.)

GEOLOGICAL MUSEUM.

This building is situated on Sussex street, Ottawa. It was formerly occupied by the Military from 1867 to 1871, and was afterwards made use of as the Clarendon Hotel until 1879-80, when it was purchased, extended, improved and fitted up as a Geological Museum.

The Geological Museum was transferred from Montreal to Ottawa in 1881. (See Appendix No. 2, at page 181.)

KINGSTON PENITENTIARY.

This building was commenced in 1833, and was placed, by an Order in Council, under the Department of Public Works on the 17th of November, 1874. Since that time considerable additions and improvements have been made to it, and from six to eight hundred prisoners can now be lodged there. (See description in Appendix No. 2, pages 187—189; and General Report, 1867, at pages 541—593.)

OBSERVATORY.

It is established at Toronto. For description, see General Report of 1867, at page 258, Appendix No. 23.

IMMIGRATION BUILDINGS.

There are two sheds, one at Toronto and one at London. (See Appendix No. 2, pages 195 and 202.)

PROVINCE OF MANITOBA.

The Dominion Government possesses the following buildings at Winnipeg:—Post Office, Custom House, Dominion Lands Office, and an Immigration Shed and Hut Barracks (at Fort Osborne). A Parliament Building and residence for the Lieutenant-Governor are now in progress of construction. (See Appendix No. 2, pages 204, 205.)

MANITOBA PENITENTIARY, STONY MOUNTAIN.

This building is 14 miles from the City of Winnipeg; it was commenced in 1873 and completed and occupied in 1877.

It contains sixty-seven cells for prisoners besides the apartments for the Wardens and officials, and is provided with bath rooms, water closets, boiler and fuel rooms, dining hall and kitchen, &c.; the building is heated by steam.

Two single guards' dwellings, a school room, ice house and other buildings have been erected, and others are in course of construction. (See Appendix No. 2, at page 206.)

NORTH-WEST TERRITORIES.

BATTLEFORD.

LIEUT.-GOVERNOR'S RESIDENCE, ETC.

The Federal Government have constructed the following buildings at Battleford :—

Lieut.-Governor's residence, a wooden building on a stone foundation.

Stipendiary Magistrate's residence, a wooden building on a stone foundation.

Registrar's residence, a wooden building on a stone foundation.

Clerk of the Council's residence, a wooden building on a stone foundation.

Commandant's quarters, a wooden building on a stone foundation.

Registry Office, a brick building on a stone foundation.

These buildings were completed and ready for occupation in 1878.

For description of each building, see Appendix No. 2, at pages 206—207.

PROVINCE OF BRITISH COLUMBIA.

VICTORIA.

The Federal Government buildings at this place are :

The Post Office, Savings Bank, Public Works and Indian Department Offices in the same building, which is of stone and was erected in 1873-74: the front wall had to be re-built in 1879-80, owing to the disintegration of the stone.

The Custom House, Inland Revenue and Marine Offices in one building.

This is a brick building on a stone foundation ; it was placed under contract in 1873-74 and completed in 1875-76.

The Marine Hospital, capable of accommodating forty patients ; it was commenced in 1872-73 and completed in 1874-75. This is a stone building.

The Drill Shed, which is situated on the south-west side of Menzies street.

For description of buildings in British Columbia, see pages 207, 208 of Appendix No. 2.

NEW WESTMINSTER.

BRITISH COLUMBIA PENITENTIARY.

This is a building with walls of stone backed with brick, containing sixty-seven cells for prisoners besides rooms and offices for the officials, and for the heating apparatus, etc.

It was commenced in 1874-75 and completed in 1877-78.

POST OFFICE AND CUSTOM HOUSE, SAVINGS BANK AND TELEGRAPH OFFICE.

These are to be provided for in one building which is to be of brick with a stone foundation.

Work was commenced in 1881 and is still in progress.

DRILL SHED.

This is a wooden building, which is situated on Mackenzie street.

See page 208 of Appendix No. 2 for description of buildings, New Westminster.

For details of expenditure on the different buildings of each Province and of the North-West Territories, see Appendix No. 1.

EXPENDITURE ON PUBLIC BUILDINGS.

The expenditure on construction of Buildings up to the 30th June, 1882, amounted to \$16,549,334.32.

Subdivided as follows:—

Prior to Confederation.

On buildings which became the property of the Dominion on 1st July, 1867	\$4,183,460 89	
On buildings subsequently transferred to Local Governments of Quebec and Ontario.....	5,053,099 81	
	<hr/>	\$9,236,560 70

Since Confederation.

On buildings belonging to the Dominion :

Government expenditure.....	\$7,286,432 12
Other than Government expenditure.....	9,933 33
	<hr/>
	\$7,296,365 45

On buildings belonging to Local Govern-

ments of Quebec and Ontario..... 16,408 17

\$7,312,773 62

Total..... \$16,549,334 32

See Appendix No. 43, pages 1203, 1272.

PORTS, HARBOURS, RIVERS, BREAKWATERS, &c.

The importance of this division of the Department of Public Works is explained in the Introduction to the General Report of the Commissioner of Public Works, 1867 (pages 1—5.)

In the vast region which extends from the coast of the Atlantic to that of the Pacific Ocean, between the lines 42° , $45\frac{1}{2}^{\circ}$ and the North Pole, it may be said that Nature has spread great rivers and sheets of water, as well as ports where vessels may lie to or seek refuge. But it being man's task, sometimes, to wrestle with the works of nature in order to bring them to perfection, it has been necessary, from the very beginning of the history of the country, to improve the natural harbours and the great watercourses.

This work had already assumed considerable proportions under the Union (1841—1867) ; as may be seen by the above mentioned Report. (Introduction, pages 84—98.)

At first the municipalities were charged with these improvements. Afterwards, the expenses of these works going beyond their resources, the Steamboat and Railway Companies came to their assistance ; in time, the Government granted them supplies for this purpose. Finally, the Government took the control of the greater part of these works, which it has placed under the direction of an important division of the Department.

In the present Report, no less than twenty-one Appendices, from No. 3 to No. 18, No. 30 to No. 32, are devoted to this subject.

No. 30 contains a complete description of the inland navigation and its connections with the ocean. (See pages 791 to 904.)

No. 31 shows the depths of the water, and the dates of the opening and closing of the navigation each year in the different ports.

Nos. 4 and $31\frac{1}{2}$ give the heights of the spring and neap tides at various places on the shores of the Ocean, the Gulf and River St. Lawrence, together with other information respecting various harbours. See pages 314—315 and 930 to 935.)

Appendix No. 3 gives a report of the works executed in the ports and harbours, and upon the rivers and bays of the different Provinces. (See pages 209 to 291.)

Appendices Nos. 1, 41, 42, 43, $43\frac{1}{2}$ show details of expenditure and revenue.

PROVINCE OF NOVA SCOTIA.

In this Province one hundred and two (102) ports, harbours and rivers have been improved.

The depths of the channels in these harbours and rivers vary according to their importance, or rather according to the tonnage of the vessels which navigate them. Some are merely harbours of refuge for fishing vessels.

Appendix No. 3, pages, 210—230.

PROVINCE OF NEW BRUNSWICK.

In this Province thirty-four (34) ports, harbours, bays and rivers, of various depths and capacity, have been improved. (Appendix 3, pages 230—239.)

PROVINCE OF PRINCE EDWARD ISLAND.

In this Province nineteen (19) ports, harbours, bays and rivers have been improved. (Appendix 3, pages 239—244.)

PROVINCE OF QUEBEC.

Here we enter the Gulf and River St. Lawrence.

The Province numbers eighty-four (84) ports, harbours, bays and rivers where improvements have been made. (Appendix 3, pages 244—258.)

The principal improvements made and in progress, in connection with navigation in this Province, are the deepening of the ship channel between Quebec and Montreal, and the harbour of Montreal, and also the docks at the mouth of the River St. Charles and the Graving Dock at Lévis, in the harbour of Quebec.

The former are fully described in Appendix No. 10, pages 452 to 456, and the latter in Appendix No. 6, pages 330 to 333.

The expenditure on these works, up to 30th June, 1882, is as follows, viz :—

Quebec Harbour improvements, in mouth of River St.

Charles.....\$1,405,000 00

Lévis Graving Dock..... 350,000 00

Ship Channel between Quebec and Montreal (pre-
viously included in cost of canals).....\$2,870,075 66

Montreal Harbour Improvements :—

Works executed at the expense of
the Harbour Commissioners
of that city :—

Prior to Confederation..... \$ 43,538 67

Since Confederation..... 1,560,918 65

\$1,604,457 32

ADD—Expenditure by Govern-
ment prior to Confederation. 521,100 00

Do since Confederation..... 747 25

Total expenditure Montreal Harbour.\$2,126,304 57

See Appendix No. 43, pages 1216—1217.

PROVINCE OF ONTARIO.

In this Province sixty (60) ports, harbours, bays and rivers have been improved. (Appendix 3, pages 258—272.)

Mention will be made of the Harbour of Toronto further on. Full details respecting this harbour and its improvements will be found in Appendix No. 14, pages 516 to 534.

PROVINCE OF MANITOBA.

The Government has caused improvements to be made to the River Assiniboine and Red River. (Appendix 3, pages 272—273.)

PROVINCE OF BRITISH COLUMBIA.

The Dominion Government has made and continues to make improvements in the Rivers Cowichan, Courtnay, Fraser, Naas and Skeena, and in the Harbour of Victoria. (Appendix 3, pages 273—276.)

A graving dock is being built at Esquimalt under the terms of an Imperial Order in Council of the 16th May, 1871, and Dominion Acts 37 Victoria, chapter 17, and 43 Victoria, chapter 15. The Imperial Order in Council of the 16th May, 1871, admitting British Columbia to the Confederation, provided for the guarantee by the Dominion, of "the interest for ten years from the date of the completion of the works, at the rate of 5 per centum per annum, on such sum, not exceeding £100,000 sterling, as may be required for the construction of a first-class graving dock at Esquimalt," and by Act 37 Victoria, chapter 17, of the Dominion, it was provided that in lieu of such guarantee advances were to be made from time to time by the Governor in Council, out of the Consolidated Revenue Fund, upon certificates of the progress of the work; such advances not to exceed, in the whole, \$250,000.

The Act 43 Victoria, chapter 15, further provided that such advances were to be made on the certificate of the Engineer of the Provincial Government, countersigned by the agent of the Dominion Government in British Columbia.

Under these Acts the Government of British Columbia invited tenders for the work, and awarded the contract for its execution to Messrs. F. B. McNamee & Co., and on account of that contract payments upon certificates have been made by this Department to the extent of \$47,660.22.

The Government of British Columbia has since cancelled Messrs. McNamee & Co's. contract, and by advertisement, dated 31st October, 1882, called for tenders for the completion of the dock. The Department has not been made aware whether another contract has been awarded as yet.

SURVEYS AND EXAMINATIONS IN THE DIFFERENT PROVINCES CONNECTED WITH IMPROVEMENT OF HARBOURS AND RIVERS.

Several other ports, harbours, bays and rivers require improvements, with a view to which the Government caused and continues to cause surveys and examinations to be made in a number of places, the list of which will be found in Appendix 3, pages 276—284, in Appendix 4, pages 292—318, and in Appendix 5, pages 320—327.

In pages 285-290 will be found a table of the piers and wharves belonging to the Government in the Provinces of Ontario and Quebec.

The Appendices numbered 4 to 18 are so many reports on the improvements made and projected in the principal ports, harbours, and rivers of Canada from 1867 to 1882. To give an idea of them, it will be sufficient to mention the title and to point out briefly the subject of each.

HARBOURS—MARITIME PROVINCES.

APPENDIX No. 4.—Report on various Harbours of the Maritime Provinces.

This Report was submitted in the month of May, 1872, and shows the nature and probable cost of the projected improvements, while specifying whether they are within the province of the Federal or Local Governments. (Pages 291—318.)

PROPOSED HARBOUR OF REFUGE BETWEEN RIMOUSKI AND FATHER POINT.

APPENDIX No. 5.—Report on proposed Harbour of Refuge between Rimouski and Father Point, upon the southern bank of the River Saint Lawrence, below Quebec; by Mr. G. F. Baillargé.

By this Report it appears that Pointe à Pouliot and Father Point, are the only two sites where this Harbour can be fixed, between the points named, on the south shore of the St. Lawrence below Quebec. (Pages 320—327.)

HARBOUR OF QUEBEC AND GRAVING DOCK AT LÉVIS.

APPENDIX No. 6.—Report on the improvements in Quebec Harbour, the Graving Dock at Lévis, and on the operations of the Lifting Barge, since Confederation, by the Quebec Harbour Commissioners.

By the Act thirty-eight Vic. cap. fifty-six, the Quebec Harbour Commissioners were authorized to borrow an amount which, with the funds voted by the Canadian Parliament, or granted by the Imperial Government, was to be employed in constructing a Graving Dock in Quebec Harbour.

The site was chosen at St. Joseph de Lévis, by an Order in Council dated in the month of May, 1877. On the seventeenth of August, 1878, the Commissioners awarded this undertaking to Messrs. Larkin, Connolly & Co., and the works were to be completed in 1882. (Pages 329—333.)

APPENDIX No. 7.—A Report respecting the formation, motion, breaking up, etc., of the ice and the prevailing currents and winds in the Harbour of Quebec, as affecting the location of the projected Graving Dock. (Pages 335—342.)

LAKE ST. JOHN AND RIVER SAGUENAY.

APPENDIX No. 8 is a Report, or rather a series of reports, respecting the Lake St. John and Saguenay regions, and the works executed and in progress therein. The Lake St. John region seems destined to become one of the most important of the Province of Quebec, and its geographical and geological features, its climate, agricultural resources and population are so many subjects which present an interest

which the future will only render more vivid, according as this beautiful region shall become developed. This Report then will become, later on, an important document to refer to.

It is divided into three parts:—

1. Lake St. John and Tributaries. (Pages 346—365.)
2. River Saguenay and Tributaries, etc. (Pages 368—388.)
3. Lake St. John, River Saguenay and Hudson's Bay; notes, etc. (Pages 390—446.)

FLOODS ON THE ST. LAWRENCE BETWEEN QUEBEC AND MONTREAL.

APPENDIX No. 9.—This Appendix is the Report of a Commission appointed, in October, 1873, to enquire into the cause of the floods which occur periodically at certain places between Montreal and Quebec, following the course of the River St. Lawrence, in order to inform the Government as to the best means to be taken to remedy them. (Pages 448—450.)

SHIP CHANNEL BETWEEN QUEBEC AND MONTREAL.

APPENDIX No. 10.—This Appendix is upon the deepening of the ship channel between Quebec and Montreal, through the St. Lawrence River. It is a report by the Montreal Harbour Commissioners on the works which they were authorized to undertake by the Act 31, Vic. cap. 60 (1873) and the Order in Council, dated the 31st May, 1873. (Pages 451—456.)

APPENDIX No. 11.—This is a Memorandum of the Montreal Harbour Commissioners, with reference to the debt incurred by the said Commissioners for the works of deepening the Channel between Montreal and Quebec. This memorial was submitted to me on 31st March, 1879. (Pages 457—462.)

HARBOUR DUES AND TRANSIT CHARGES AT MONTREAL AND ATLANTIC PORTS.

APPENDIX No. 12.—This is a Report of the Montreal Board of Trade and Montreal Corn Exchange Association, on the Harbour dues and transit charges at Montreal and at the Atlantic Ports.

This Report suggests the reduction, and, in some cases the abolition, of these dues, in order to attract the commerce of the West to Montreal. (Pages 463—493.)

IMPROVEMENT OF THE RAPIDS OF THE ST. LAWRENCE BETWEEN MONTREAL AND LAKE ST. FRANCIS.

APPENDIX No. 13.—This is a Report, with estimates, on the cost of improving the navigation of the most dangerous parts of the River St. Lawrence, at the Rapids between the Lakes St. Francis and St. Louis, and between the latter lake and the Harbour of Montreal, in order to facilitate the descent and ensure the safety of vessels shooting these rapids.

Since this Report was made, a new channel has been made in the Batture à Bacot, between the Cedars and Cascades, where, during low water, there was only a depth of six and a-half feet.

The new channel has a depth of eight feet and a width of 150 feet. See table of Navigation of the St. Lawrence, No. 5 of Appendix No. 30.

This Report was drawn up by Mr. G. F. Baillairgé, my deputy, and by Mr. S. Keefer, C.E.

HARBOUR OF TORONTO.

APPENDIX No. 14.—This Appendix contains a Report by Captain James B. Eads, C.E., and a memorandum by Mr. H. F. Perley, Chief Engineer of the Department, as to the means of maintaining and improving the Toronto Harbour, the entrances to which, and its interior, are filling up from causes carefully studied and explained by the authors of these Reports. (Pages 515—534.)

OVERFLOW OF LAKE MANITOBA.

APPENDIX No. 15.—This is a Report by Mr. H. F. Perley, Chief Engineer of the Department, and by Mr. Thomas Guerin, C.E., on the overflow of Lake Manitoba, the means of lowering the lake level, and of draining the country which surrounds it. (Pages 536—556.)

HARBOUR OF VICTORIA, BRITISH COLUMBIA.

APPENDIX No. 16.—The Harbour of Victoria, in British Columbia, requires some improvements; Appendix contains Reports by the Hon. B. W. Pearse, and the Hon. J. W. Trutch, C.M.G. on the works already done and those still required to be done for the purpose. (Pages 557—566.)

FRASER RIVER, BRITISH COLUMBIA.

APPENDIX No. 17.—The letter on this explains its subject:—

Report of a survey made of the Fraser River, B.C., by the Hon. B. W. Pearse, and Mr. G. B. Wright, and Report of the work done for the improvement of Cottonwood Canon on the Upper Fraser River, by the same, with a statement of works remaining to be done; and also Report by Hon. J. W. Trutch and Mr. George Turner, on the dredging operations carried on in the Fraser River. (Pages 568—582.)

OBSTRUCTIONS OF NAVIGABLE RIVERS BY SAW-MILLS AND OTHER MANUFACTORIES.

The establishment of saw-mills and other manufactories upon the principal navigable streams and rivers all over Canada, has caused certain inconveniences detailed in Appendix No. 18, the principal of which are the obstruction of these streams and rivers, the corruption of the water, and the destruction of the fish, from the fact that persons working these various manufactories throw into the waters the refuse from their establishments, such as saw-dust, edgings, etc., etc. Complaints having been made

on this subject, the Government, on 6th November, 1871, appointed a Commission charged to make inquiries, and to report with respect to these complaints. The Appendix contains the Report of that Commission, as well as the text of the Act thirty-six Vic., chap. 65, having for its title "An Act for the better protection of navigable streams and rivers." (Pages 583—640.)

EXPENDITURE ON HARBOURS AND BREAKWATERS.

The expenditure on these works up to 30th June, 1882, amounted to \$7,875,035.48. Subdivided as follows, viz :—

Government expenditure—

Prior to Confederation	2,393,860	54
Since Confederation... ..	3,653,091	79
	—————	\$6,046,952 33

Other than Government expenditure—

Prior to Confederation.....\$	52,038	67
Since Confederation	1,776,044	48
	—————	1,828,083 15

Total.....		\$7,875,035 48
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EXPENDITURE ON IMPROVEMENT OF RIVERS.

The expenditure on these works up to 30th June, 1882, amounted to \$714,363.36. Subdivided as follows, viz :—

Government expenditure—

Prior to Confederation	\$	28,354	33
Since Confederation.....		678,609	03
		—————	\$706,963 36

Other than Government expenditure

Prior to Confederation. (Not ascertained.)

Since Confederation.....	7,400	00
	—————	7,400 00

Total.....		\$714,363 36
------------	--	--------------

The expenditure on harbours and breakwaters, and on the improvement of rivers, includes the sums paid out of special appropriations together with those paid out of the appropriations for dredging.

For details respecting cost of construction and revenue, see Appendices Nos. 1, 41, 42, 43, 43½, pages 118, 1066, 1072, 1079, 1241, 1278.

DREDGING PLANT.

The Dredging Plant owned by Government and operated by my Department consists of the following:—

In the Maritime Provinces.

Elevator dredge "St. Lawrence."

" " "Canada."

Spoon dredge "New Dominion," and 10 scows.

" " "Prince Edward," and 4 scows.

" " "Cape Breton," and 7 scows.

" " "Geo. McKenzie," and 3 scows.

In Quebec.

Spoon dredge "Queen of Canada," 2 scows, 2 stone lifters.

" " "Nipissing."

Tug "Dennis."

Also, stone lifter "Baillairgé," for working in the rapids of the St. Lawrence and a dredging machine at the Saguenay.

In Ontario.

Spoon dredge "Challenge, and 3 scows.

Tug "Trudeau."

In British Columbia.

Dredger and tug "Georgia," and steamer "Sir James Douglas" (under Department of Marine and Fisheries).

The elevator dredges are self-propelling; the spoon dredges have to be towed from place to place, and when working, require the services of tugs to remove the scows to and from places of deposit.

Owing to the large quantities of dredging required during some years, it became necessary at times to employ the services of dredges, etc., other than those the property of the Government.

It is proposed to build three tugs for service in the Maritime Provinces, and two additional scows for Quebec and Ontario; to procure for Ontario a new spoon dredge, two scows, and a steam tug; to build and equip a self-propelling "snag boat" for British Columbia, to place buoys in high water and remove snags in low water; and to procure a dredge, two scows and a tug for service in Manitoba, in improving the Red River, Lake Winnipeg, etc.

The following is a statement of the expenditure on dredges and tugs owned by Government :—

Maritime Provinces.

	\$	cts.
Dredge " St. Lawrence " (N. S. and N. B.)..	116,389	48
" " Canada".....	42,778	44
" " New Dominion " ..	30,826	51
" " Cape Breton ".....	19,744	38
" " Geo. McKenzie " (purchased 1879).	15,000	00
Tugs (plant, etc.).....	350	50
	<u>225,089</u>	31
Dredge " Prince Edward " (P. E. I.).....	23,582	07
	<u>23,582</u>	07

Quebec.

Dredge " Queen of Canada ".....	15,000	00
" " Nipissing " (purchased 1880).....	13,501	57
Tug " Dennis " (purchased 1880)	2,000	00
Dredging vessels, generally.....	6,872	43
	<u>37,374</u>	00

Ontario.

Dredge " Challenge "	31,211	32
Tug " Trudeau ".....	6,847	05
Dredging vessels, generally	21,600	00
	<u>59,658</u>	37

British Columbia.

Dredger.....	} 93,447	96
Steamer " Sir James Douglas "		
Tug " Georgia ".....	6,250	00
	<u>99,697</u>	96

Total..... \$445,401 71

(See Appendix No. 43, pages 1245—1272.)

LIGHTHOUSES.

Prior to Confederation, the construction and management of the lighthouses in the different Provinces were vested in the Department of Public Works. There were only two exceptions to this rule :—

1. In the Province of Quebec, all the lighthouses situated below Montreal were under the management of the Trinity Houses of Montreal and Quebec.

2. In New Brunswick the lighthouses were managed by the Board of Commissioners of Public Institutions.

Since Confederation, the Department of Marine and Fisheries has had the management of lighthouses, buoys, beacons, etc.

By an Order in Council, dated 10th January, 1870, the Department of Marine and Fisheries is charged with the erection of lighthouses when the cost of construction does not exceed \$10,000.

Since Confederation, the Department of Public Works has constructed and repaired the lighthouses at twenty places in Nova Scotia; three in New Brunswick; three in the Province of Quebec; eleven in the Province of Ontario, and one in British Columbia. (For details see Appendix 19, pages 641—644.)

EXPENDITURE ON LIGHTHOUSES BEACONS AND BUOYS.

The expenditure on the construction of these works up to 30th June, 1882, amounts to \$2,872,203.49

Sub-divided as follows :

Government expenditure—

Prior to Confederation, in former Provinces of

Upper and Lower Canada. \$1,685,930 84

Since Confederation—

By Department of Public Works 75,588 51

By Department of Marine and Fisheries.. 1,110,624 14

Total. \$2,872,203 49

Expenditure in Maritime Provinces and British Columbia prior to Confederation, not ascertained.

For details of expenditure given above, etc., see Appendices Nos 1 and 43. Pages 137, 1263, 1272.

For expenditure by the Department of Marine and Fisheries, see Appendix N^o 43, page 1264.

ROADS.

The General Report of 1867 explains the system under which the highways of communication were constructed and maintained in the Provinces of Upper and Lower Canada (now Ontario and Quebec), prior to the time of Confederation.

It contains an enumeration and description of the roads constructed, improved or maintained, sold, transferred or abandoned by the Government, up to 1st July 1867.

The land routes constructed or maintained by the General Government were portions of the main highways—especially in the newly settled districts—the inter provincial and military roads.

The former are now under the control of the Local Governments or municipalities, and in some cases under the charge of private companies; the latter are still maintained by the Federal Government.

For details respecting the construction, description and cost of roads, see Commissioner's General Report of 1867, pages 111 to 118, and the Appendix of the same Report, at pages 166 to 180, 437 to 444, 511 to 516, 579 to 582.

NORTH-WEST COMMUNICATION.

THE DAWSON ROUTE.

This has already been referred to in connection with the Canadian Pacific Railway.

The Dawson route, which is now superseded by a portion of the Canadian Pacific Railway, extends from Prince Arthur's Landing, Thunder Bay, on the north shore of Lake Superior, to Fort Garry (Winnipeg), a distance of 452 miles. It includes the intermediate rivers and lakes and the Fort Frances Lock, which form a portion of the route. The distance by the railway is 435 miles.

This highway was formerly used by immigrants and for military purposes.

The route is fully described in Appendix No. 19 of this Report, pages 646 to 652.

See also Appendix No. 30, Part I, pages 825 to 827, and Statements 17 and 18 in Part III of the same Appendix for further details respecting the Fort Frances Lock, etc.

For Expenditure, etc., see Appendix No. 1.

The steamboat voyage from Collingwood, Lake Huron, to Prince Arthur's Landing, is 532 miles in length.

BRIDGES.

Prior to Confederation the Provincial Governments, from time to time, granted supplies to the municipalities for the construction of bridges at important places upon the principal highways.

Since that time, by an Order in Council, dated 11th February, 1871, bridges have been classed in three categories :—

1. Bridges built and maintained by the Dominion Government solely.
2. Bridges built and maintained partly by the Dominion Government and partly by local authorities.
3. Bridges in which the Dominion Government has no interest and in respect of which it should not contribute. (Appendix No. 19, pages 653, 654)

For enumeration, descriptions and cost of bridges constructed by Government prior to 1st July, 1867, see Appendix No. 29, pages 180 to 192; and No. 70, pages 583 to 584 in General Report of 1867.

For list of roads and bridges sold, transferred or abandoned by Government prior to 1st July, 1867, see Appendix No. 26 of the same Report.

For those which have been sold, transferred or abandoned since 1st July, 1867, see Appendix No. 36 of this Report.

EXPENDITURE ON ROADS AND BRIDGES.

The expenditure on the construction of these works up to 30th June, 1882, amounts to \$7,717,750.49.

Sub-divided as follows, viz. :—

Government expenditure—

On roads and bridges in Quebec and Ontario
which became the property of the Do-
minion Government on 1st July, 1867—

Prior to Confederation..... \$481,554 52

Since Confederation 1,144,436 55

—————\$1,625,991 07

On roads and bridges transferred to Local Govern-
ments of Quebec and Ontario—

Prior to Confederation.....\$6,066,560 07

Since Confederation 25,199 35

—————\$6,091,759 42

Total\$7,717,750 49

For details of expenditure, etc., see Appendices Nos. 1, 42, 43.

SLIDES AND BOOMS.

These constructions are for the purpose of facilitating the descent of lumber to the localities where the rafts are made up, and thence to the ports where it is shipped for exportation.

The Department possesses slides and booms in four great lumbering districts namely :—

1st. Saguenay River District. (Appendix No. 20, pages 655—656.)

2nd. The St. Maurice River District. (Appendix No. 21, pages 657—660.)

3rd. The Ottawa District. (Appendix No. 22, pages 661—676.)

4th. The Trent District. (Appendix No. 23, pages 677—682.)

The subjects of the four succeeding Appendices are fully explained by their titles, namely :—

APPENDIX No. 24.—Tabular statement of the slides and booms of the Saguenay, Saint Maurice, Ottawa and Trent Districts, showing the dimensions, etc., of these constructions. (Pages 683—720.)

APPENDIX No. 25.—Proclamations respecting tolls and regulations on the various Public Works. (Pages 721—733.)

APPENDIX No. 26.—Tabular statement showing the number of pieces of timber which have passed through the Saguenay, St. Maurice, Ottawa and Trent Slides, showing the gross revenues, deductions, net revenues and deficits of this service. (Pages 735—738.)

APPENDIX 27.—Tabular statement of the Forest woods of North America, their Botanical, English and French names, the places where they are chiefly found, their dimensions, qualities, and the purposes for which they are principally used. (Pages 739—753.)

EXPENDITURE ON SLIDES AND BOOMS.

The expenditure on the construction of these works up to 30th June, 1882, amounts to \$1,651,762.93,

Sub-divided as follows, viz:—

Government expenditure

Prior to Confederation.....\$1,346,652 67

Since Confederation..... 305,110 26

Total.....\$1,651,762 93

For details respecting the cost of construction, repairs and management of slides and booms, and also respecting the revenue derived therefrom, see Appendices Nos. 1, 24, 42, 43 at pages 123, 720, 1116, 1272 and Appendix to General Report 1867 at pages 156, 157, 560.

TELEGRAPH AND SIGNAL SERVICE.

APPENDIX No. 28 (pages 755—761).—Contains an historical account of telegraph lines held by Government. By this it may be seen that the Government, at the present time, holds and works in the different Provinces, 152 miles of submarine cables and 2,566 miles of land telegraph in s.

The Government has also established signal stations at twenty-four important points, and more will be established elsewhere as the requirements of navigation demand.

APPENDIX No. 29 (pages 763—789).—Contains two letters from the Hon. P. Fortin, M.P., respecting the telegraph and signal service system in the Gulf of St. Lawrence; and also the Norwegian telegraph system, showing its importance in connection with the development of the sea fisheries of that country.

These two letters are followed by tabular statements on the telegraph and signal service throughout Canada.

EXPENDITURE ON TELEGRAPH AND SIGNAL SERVICE.

The expenditure on construction up to 30th June, 1882, amounts to \$1,068,421.22.
Subdivided as follows, viz:—

Government expenditure—

Prior to Confederation.....None.

Since Confederation—

By Department of Railways and Canals (included in cost of Pacific Railway)	\$670,620 84
By Department of Public Works.....	360,050 38
	—————\$1,030,671 22
Total, exclusive of subsidies.....	\$1,030,671 22

Subsidies—

Métis to Baie des Chaleurs....	\$16,000 00
Canso to Dartmouth.....	20,000 00
Cape Ray and Port aux Bas- ques, Newfoundland, (not yet paid)	1,750 00
	————— 37,750 00

Total, including subsidies.....\$1,068,421 22

INLAND NAVIGATION, OCEAN ROUTES, AND GOVERNMENT LAND ROUTES, OF CANADA.

A brief outline of the Appendices which refer thereto will be sufficient to indicate their contents.

APPENDIX No. 30.—This Appendix is divided into four parts, namely:—

1. Tabulated profiles of the inland navigation of Canada.
2. Ocean routes between Canada and foreign countries,
3. Canadian land routes to the seaboard, Government railways, telegraph lines, and railway mail routes of Canada, etc.
4. The principal overland mail routes and lines of railway and water communication in Manitoba, the North-West Territories and British Columbia.

These tables show the lengths of the various stretches of navigation; their rise and fall; the number and dimensions of the locks; the heights of the rivers, lakes, and

canals above tide-water at Three Rivers; the lowest draught of water on existing or proposed lines of inland navigation; the dimensions of the largest vessels which can pass through the various canals and locks; the comparative distances of the ports of Canada and of the United States, from the different foreign ports; the various mail routes, by rail or water, in Manitoba, the North-West Territories and British Columbia, in connection with the various works completed, in course of construction or proposed up to the 1st July, 1882.

APPENDIX No. 31.—This Appendix gives the dates of the opening and closing of navigation at the principal ports on the sea-board, in the Gulf, River and Lakes of the St. Lawrence; on the canals of the various routes of inland navigation, and on the Erie and Champlain Canals, &c.

It shows that the opening of navigation, on the Canadian Canals, generally takes place about the 1st of May, and the closing about the 1st of December in each year.

It shows, also, the ports which are generally open during the whole winter season.

For details prior to 1867, see the General Report, pages 374 to 400.

APPENDIX No. 31½.—Statement indicating the time of high water at full and change, and the rise of neap and spring tides, at various places in Canada.

ARRIVALS, AND TONNAGE, &c., OF VESSELS AT THE PRINCIPAL SEA-PORTS OF CANADA.

APPENDIX No. 32.—This Appendix gives a comparative statement of the number of vessels, their aggregate tonnage and their crews, which have arrived from sea at the ports of Halifax, Nova Scotia; St. John, New Brunswick; Charlottetown, Prince Edward Island; Quebec and Montreal, Province of Quebec; and Victoria, British Columbia, from 1867 to 1882. Compiled from "Trade and Navigation Returns."

VESSELS BUILT AT THE PRINCIPAL SHIP-BUILDING PORTS OF CANADA.

APPENDIX No. 33.—This Appendix gives the number and tonnage of steam and sailing vessels built at the principal ship-building ports in the Provinces of Nova Scotia, New Brunswick, Quebec and Ontario, from 1867 to 1882. This Appendix was compiled from "Trade and Navigation Returns."

For details prior to 1867, see the General Report, pages 424, 425.

VESSELS WRECKED ON THE SEA-COAST, AND ON THE ST. LAWRENCE.

APPENDIX No. 34.—This shows the number of sea-going and coasting vessels wrecked on the sea-coast, in the Gulf, River and Lakes of the St. Lawrence, in Canada, from 1867 to 1881. This Appendix was compiled from the Annual Reports of the Department of Marine and Fisheries.

For vessels wrecked prior to 1867, see the General Report, pages 426 to 428.

ARBITRATIONS AND AWARDS.

The Public Works Act, 31 Vic., chap. 12, provided for the appointment of a Board of Official Arbitrators, to consist of not more than four members; their duties to be to enquire into such claims, arising from contracts, expropriations of lands, etc., as might be referred to them by the Minister of Public Works.

The powers of the Board were increased by, and matters affecting arbitrations were made the subjects of subsequent Acts, viz.:—33 Vic., chap. 23; 41 Vic., chap. 8, and 42 Vic., chap. 8.

The Act 33 Vic., chap. 12, provided for the reference to the Arbitrators of claims made against any of the Departments of the Government.

At the time of the division of the Department of Public Works, under Act 47 Vic., chap. 7, the Board of Arbitrators was placed under the control of both the Department of Public Works and the Department of Railways and Canals.

For Statement of the claims submitted to the Dominion Arbitrators, with the result of the arbitration in each case, see Appendix No. 35.

PROPERTIES SOLD, TRANSFERRED, OR ABANDONED.

APPENDIX No 36.—This Appendix shows:—

1. Properties purchased or sold by the Department of Public Works.
2. Properties transferred or abandoned by the Department.
3. Properties transferred by the Dominion Government to the Local Governments, or by the Local Governments to the Dominion Government.

ORDNANCE AND NAVAL PROPERTY.

APPENDIX No. 36½.—This Appendix consists of:—

1. Order in Council of 29th October, 1879, approving and confirming the classification of War Department properties in New Brunswick, as per Schedule to Act 42 Vic., chap. 33, of 15th May, 1879.

2. Order in Council of 19th May, 1879, to the same effect as regards War Department properties in Ontario and Quebec, as per Schedule to the Act, Consolidated Statutes of Canada, 22 Vic., chap. 36.

3. Order in Council of the 16th November, 1869, classifying certain Ordnance property in Ontario and Quebec, belonging to the Dominion Government, under Section 108 of the "British North America Act of 1867."

4. Statement of War Department lands, and buildings and naval property at Toronto, Kingston, Montreal, Sorel, Quebec, Point Lévis, surrendered to the Dominion Government in 1870-71 and 1871-72.

The general report of 1867 contains full particulars respecting the transfer of the Carillon, Chute à Blondeau, Grenville and Rideau Canals, together with other properties, by the Imperial to the Canadian Government prior to 1st July of that year. See Commissioner's report at page 51, and Appendices 58 and 60 of his Report at pages 444 to 450, in 1867.

ACTS RELATING TO PUBLIC WORKS.

APPENDIX No. 37.—Acts relating to Public Works of Canada. Pages 1028—1031.

See Appendix No. 59 of General Report, 1867, for list of Acts, 1838 to 1st July, 1867. Page 448.

OLD PLANS, DEEDS, &C., RELATING TO GOVERNMENT PROPERTY.

APPENDIX No. 38.—List of plans, deeds, etc., relating to Government property, etc., at Quebec and elsewhere, showing where these plans, deeds, etc., can be procured, and those which have been copied for the use of the Department of Public Works. Pages 1034—1042.

CONTRACTS AWARDED.

APPENDIX No. 39.—List of contracts awarded by the Department of Public Works from 30th June, 1867, to the 30th November, 1882. Pages 1044—1056.

PLANS AND MODELS SENT TO PARIS EXHIBITION.

APPENDIX No. 40.—Memorandum respecting Canadian Canals, and also the plans and models, etc., sent by the Department of Public Works of Canada to the Paris Exhibition in 1878. Pages 1058—1064.

EXPENDITURE AND REVENUE—PRINCE EDWARD ISLAND—ON PUBLIC WORKS.

APPENDIX No. 41.—Expenditure by Provincial Government of Prince Edward Island on Harbour Works, before and since the entrance of that Province into Confederation, 1st July, 1873. Also revenue accrued from such Works since 1st July, 1873. Pages 1066—1074.

REVENUE FROM PUBLIC WORKS, CANADA.

APPENDIX No. 42.—Tabular statement showing the revenue from the Public Works of Canada since date of Confederation, 1st July, 1867, by Mr. O. Dionne, accountant in the Department. Pages 1076—1135. For revenue in Upper and Lower Canada prior to Confederation, see Appendix, pages 454 to 480 of General Report, 1867.

COMPARATIVE STATEMENT OF TRAFFIC ON RAILWAYS AND CANALS.

APPENDIX No. 42 $\frac{1}{2}$.—Comparative statement of passengers and freight traffic on railway lines which compete with canals in Canada and in the State of New York, etc., U.S. Pages 1137—1141.

COST OF PUBLIC WORKS, CANADA.

APPENDIX No. 43.—Tabular statement showing the cost of construction of Public Works in Canada, as far as it is possible to state those expenses, previous to and since Confederation, or from commencement of such works to 1st July, 1882. Page 1144.

For cost of Public Works in Upper and Lower Canada before Confederation, 1st July, 1867, see Appendix No. 70 of General Report, 1867, pages 481 to 613.

The cost of the Public Works in the other Provinces, prior to Confederation, has not been fully ascertained.

EXPENDITURE ON THE CONSTRUCTION OF THE PUBLIC WORKS OF CANADA.

The expenditure on the construction and improvement of Public Works in each Province of the Dominion is as follows :—

Prior to Confederation—

Nova Scotia (Railways and Canals only).....	\$6,280,764 47
Prince Edward Island (Railways and Harbours only).....	3,339,116 13
New Brunswick (Railways only) ..	4,642,484 39
Quebec (formerly Lower Canada) ..	18,842,437 22
Ontario (formerly Upper Canada) ..	34,978,662 31
British Columbia (Dredges only) ..	92,000 00
	<hr/> \$68,175,464 52

Since Confederation—

Nova Scotia	11,924,099 44
Prince Edward Island	1,057,734 43
New Brunswick	14,743,440 18
Quebec	24,149,766 22
Ontario	32,209,056 86
Manitoba	6,352,985 06
North-West Territories	2,977,337 39
British Columbia	5,093,396 38
Miscellaneous	132,491 24
	<hr/> \$98,640,307 20

Total expenditure on Dominion Government

Works.....\$166,815,771 72

Apart from the above, a sum of \$11,119,659.88 was expended, prior to Confederation, by the Provincial Governments of Lower and Upper Canada, on construction of works which were either transferred to Local Governments of Quebec and Ontario, or abandoned to municipal authorities. See Appendix 43, page 1268.

The expenditure prior to Confederation, in the Maritime Provinces, as far as ascertained, will be found in the supplementary statement published at end of Appendix No. 43, excepting expenditure on Railways, St. Peter's Canal, and Harbours Prince Edward Island, which is included above.

See Appendix No. 43, pages 1274, 1275 and App. N. 43½, pages 1278-1283.

EXPENDITURE ON HARBOURS, ROADS AND BRIDGES, NOVA SCOTIA.

APPENDIX No. 43½.—Expenditure by the Provincial Government of Nova Scotia on Harbours, Roads and Bridges, during the fifteen years previous to Confederation, 1st July, 1867. Pages 1278—1283.

ALTITUDES OF VARIOUS PLACES IN QUEBEC.

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ENGLISH AND FRENCH MEASURES.

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AREA AND POPULATION OF THE GLOBE.

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APPENDIX No. 46.—Synopsis of the report on Public Works of the united Provinces of Quebec and Ontario, from their commencement to the date of Confederation, 1st July, 1867. Pages 1304—1308.

COMMISSIONERS AND MINISTERS, ETC., OF PUBLIC WORKS.

APPENDIX No. 47.—List showing the names of the Members, Commissioners and Assistant-Commissioners of the Board of Works, the Ministers and Deputy Ministers, Secretaries, Chief Engineers, Chief Architects, etc., of the Department, from the commencement, 10th February, 1841, to 1st July, 1882. Pages 1310—1311.

GENERAL REMARK.

Most of the Appendices to this Report, and of those referred to in the General Report of 1867, have been prepared under the direction and supervision of Mr. G. F. Baillairgé, my Deputy, who has been attached to this Department for a period of nearly forty years.

PERSPECTIVE VIEWS AND PLANS.

The following views and plans, are appended to this Report:—

1.—Perspective view of Rideau Hall, residence of the Governor General, Ottawa.....	Between pages	208 and 209
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3.— Do do do Library do	do	208 and 209
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7.—Plan of Quebec Harbour Improvements at mouth of River St. Charles.....	do	334 and 335
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- 1.—Map of the World's Submarine Cables and principal Telegraph Lines.
- 2.—Map showing Dominion Government Telegraph Lines along the River and Gulf of St. Lawrence below Quebec, and along the sea coast of the Maritime Provinces
- 3.—Map showing Dominion Government Telegraph Lines in part of the Province of Quebec and of the Province of Ontario.
- 4.—Map showing the Dominion Government Telegraph Lines in the Province of Manitoba and the North-West Territories.
- 5.—Map showing the Dominion Government Telegraph Lines and Cables in the Province of British Columbia.

All of which is respectfully submitted.

HECTOR L. LANGEVIN,
Minister of Public Works.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, May, 1883.

DOMINION OF CANADA.

APPENDICES

TO THE

GENERAL REPORT

OF THE

MINISTER OF PUBLIC WORKS,

FROM

30th JUNE, 1867, TO 1st JULY, 1882.

THE JOURNAL OF THE

ROYAL ANTHROPOLOGICAL INSTITUTE

THE JOURNAL OF THE

ROYAL ANTHROPOLOGICAL INSTITUTE

THE JOURNAL OF THE

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THE JOURNAL OF THE

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APPENDIX No. I

STATEMENTS OF EXPENDITURE

ON

PUBLIC WORKS IN EACH PROVINCE

OF THE

DOMINION OF CANADA,

FROM 1ST JULY, 1867, TO 30TH JUNE, 1882.

YEARLY Expenditure on RAILWAYS CONSTRUCTED

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Intercol. Ry.....	116	50,081 64	153	169,782 12	177	1,567,586 40	192	2,866,376 44	246	5,039,063 58
2	Nova Scotia Ry.	117	413,550 16	153	88,928 47	178	131,468 66	205	50,405 69	246	33,502 65
3	European and North American Ry., N.B...	117	19,721 85	153	23,904 59	178	30,326 43	....	.....	246	58,575 28
4	P. E. Island Ry. ....	....	.....	....	.....	....	.....	....	.....	....	.....
5	Pacific Ry.....	....	.....	....	.....	....	.....	198	30,148 32	246	489,428 16
	Totals ....	....	483,353 65	....	282,615 18	....	1,729,381 49	....	2,946,930 45	....	5,620,569 67

WORKING

1	Nova Scotia Ry.	210	228,276 11	243	261 398 76	299	305,524 76	285	272,409 60	338	339,324 14
2	European and North American Ry., N.B...	211	131,684 97	243	126,149 71	299	139,683 99	286	170,583 71	338	255,752 68
3	Intercol. Ry.....	....	.....	....	.....	....	.....	....	.....	....	.....
4	P. E. Island Ry. ....	....	.....	....	.....	....	.....	....	.....	....	.....
	Totals ....	....	359,961 08	....	387,548 47	....	445,208 75	....	442,993 31	....	595,076 22

(a) Including \$208,502.72 charged to "Consolidated Fund."

(b) do 88,363.18 do do

N.B.—The figures in the columns preceding amounts indicate the Part and folio in Public

for the undermentioned years.

TION.

30th June.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
137	4,827,183 71	168	3,417,661 87	201	2,645,460 92	206	998,991 46	197	1,004,057 16	22,586,245 30	1
137										(a)	
156	172,968 18	169	70,711 73	201	515,691 59	206	109,280 13	197	214,954 63	1,801,461 89	2
137										(b)	
156	201,298 48	169	126,525 21	201	264,947 04	206	50 00	197	99,340 40	824,689 28	3
.....	.....	.....	.....	201	46,086 63	207	42,546 10	197	200,000 00	288,632 73	4
137	561,818 44	169	310,224 88	219	1,546,241 67	245 250	3,346,567 06	232 239	1,691,149 97	7,975,578 50	5
.....	5,763,268 81	.....	3,925,123 69	....	5,018,427 85	....	4,497,434 75	....	3,209,502 16	33,476,607 70	

EXPENSES.

[illegible]

* For following years see Intercolonial Railway.

Accounts where expenditure may be found.

YEARLY Expenditure on CANALS

CONSTRUC

NOVA

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts.	I.	\$ cts.	I.	\$ cts.		\$ cts.		\$ cts.
1	St. Peter's	116	21,519 72	153	70,719 80	177	46,193 67	.....	.....	.....	.....
2	do Enlargement & deepening. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals .....	.....	21,519 72	.....	70,719 80	.....	46,193 67	.....	.....	.....	.....

NEW

1	Baie Verte Canal Survey .....	.....	.....	.....	.....	.....	I.	.....	II.	.....
		.....	.....	.....	.....	.....	203	17,929 34	260	6,399 41

QUE

		III.		I.		I.		I.		II.	
1	Lachine	46	1,852 70	153	2,000 00	.....	.....	193	12,231 40	247	36,708 15
2	do Enlargement ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
		I.									
		122									
3	Beauharnois—	III.									
	do Land damages.	46	63,193 75	158	55 00	180	27 50	.....	.....	261	27 50
4	Ste. Anne's Lock ...	.....	.....	.....	.....	.....	.....	.....	.....	249	1,939 46
		I.									
		115									
5	Carillon and Grenville	III.				176					
		42	19,817 23	.....	.....	180	4,167 96	.....	.....	247	15,701 85
6	do Enlargement ..	.....	.....	.....	.....	.....	.....	194	23,119 37	247	149,555 43
7	Carillon and Chute à Blondeau Dam, &c. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	Culbute Rapids Lock .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Chambly Canal .....	.....	.....	.....	.....	.....	.....	193	2,839 85	249	1,906 40
10	St. Lawrence Canals (Proportion of expenditure) .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals .....	.....	84,863 67	.....	2,055 00	.....	4,195 46	.....	38,190 62	.....	205,838 79

for the undermentioned years.

TION.
SCOTIA.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
	\$ cts.		\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	138,433 09	1
.....	195	20 97	202	11,125 00	189	63,330 18	74,476 15	2
.....	20 97	.....	11,125 00	.....	63,330 18	212,909 24	

BRUNSWICK.

II. 136 150		II.		II.		II.		II.			
	14,943 83	167	4,018 90	195	443 00	202	110 75	189	22 30	43,867 53	1

BEC.

II. 125 138 144		II.		II.		II.		II.			
.....	36,188 95 6,793 54	166 166	101,706 49 56,911 86	193 193	34,623 25 162,797 27	200 200	3,459 64 324,309 75	..... 187	..... 1,439,375 73	228,770 58 1,990,188 15	1 2
151 161	5,122 50	176	26 00	249	36 00	.....	.....	.....	.....	68,488 25	3
139	540 11	167	12,753 27	194	32,627 71	201	24,935 85	188	30,003 08	102,799 48	4
135 139 151	21,012 09	166	10,865 00	195	1,337 50	201	1,169 90	.....	.....	74,071 52	5
135	114,861 56	166	179,458 10	195	248,174 87	201	220,538 58	188	175,284 20	1,110,992 11	6
136	376 83	167	54,935 28	195	90,352 39	201	104,494 68	188	70,453 84	320,613 02	7
143	835 53	170	38,388 99	195	63,659 29	201	76,842 44	189	56,081 87	235,808 12	8
128	759 60	170	2,810 00	195	2,415 30	.....	.....	189	80 00	10,810 25	9
135	20,874 94	166	10,519 11	193	11,922 20	200	25,107 73	187	23,688 66	92,112 64	10
.....	207,365 05	.....	468,374 10	.....	647,945 48	.....	780,858 57	.....	1,794,967 38	4,234,654 12	

YEARLY Expenditure on CANALS

CONSTRUCTED

ONTARIO

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Cornwall.....	46	2,786 00	153	10,692 04	176	17,780 05	194	7 50	331	10,000 21
2	do Enlargement.....										
3	Williamsburgh.....									249	1,077 00
		I.									
		115								246	
4	Welland	42	12,097 84	152	43,486 36	176	22,173 72	193	48,569 10	329	16,826 16
5	do Enlargement.....									246	42,876 60
		I.									
		115						193			
6	Rideau.....	42	7,298 12			176	13 16	281	11,732 98	249	4,967 50
		III.						194			
7	Murray Canal Survey.....	I.									
8	Sault Ste. Marie Canal Survey.....	121	400 00								
9	St. Lawrence (Proportion of expenditure).....									249	949 35
	Totals.....		22,581 96		54,178 40		39,966 93		60,309 58		76,696 82

NORTH-WEST

1	Canal and Land Surveys.....					313	15,232 30	300	17,443 35		
---	-----------------------------	--	--	--	--	-----	-----------	-----	-----------	--	--

CANALS

1	Canals Generally...									253	1,138 50
---	---------------------	--	--	--	--	--	--	--	--	-----	----------

ABSTRACT STATEMENT of Expenditure

1	Nova Scotia		21,519 72		70,719 80		46,193 57				
2	New Brunswick.....								17,929 34		6,399 4
3	Quebec		84,863 67		2,055 00		4,195 46		38,190 62		205,838 7
4	Ontario		22,581 96		54,178 40		39,966 93		60,309 58		76,696 8
5	N.-West Territories.....						15,232 30		17,443 35		
6	Canals Generally...										1,138 5
	Totals		128,965 35		126,953 20		105,588 26		133,872 89		290,073 5

for the undermentioned years—*Continued.*

TION—*Concluded.*

RIO.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
139	1,011 75	.....	.....	194	1,780 00	....	.....	188	49,211 37	44,057 55	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	49,211 37	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,077 00	3
.....
135	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
138	21,132 00	.....	.....	197	7,137 72	277	700 00	.....	.....	172,122 90	4
135	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
138	109,026 47	165	746,420 61	197	1,039,982 19	203	1,569,478 19	194	2,199,962 61	5,707,746 67	5
.....
.....
138	18,070 97	176	5,793 16	195	9,310 85	201	2,163 96	189	214 11	59,564 81	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400 00	7
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	949 35	8
.....
135	12,366 75	166	16,022 19	193	8,689 16	200	25,107 74	187	23,688 65	85,874 49	9
.....	161,607 94	768,235 96	1,066,899 92	1,597,449 89	2,273,076 74	6,121,004 14

TERRITORIES.

.....	32,675 65	1
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GENERALLY.

.....	1,138 50	1
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on Canals—Construction.

.....	20 97	11,125 00	63,330 18	212,909 24	1
.....	14,943 83	4,018 90	443 00	110 75	22 30	43,867 53	2
.....	207,365 05	.....	468,374 10	.....	647,945 48	.....	780,858 57	1,794,967 38	4,234,654 12	3
.....	161,607 94	.....	768,235 96	.....	1,066,899 92	.....	1,597,449 89	2,273,076 74	6,121,004 14	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	32,675 65	5
.....	.....	.....	.....	.....	.....	.....	.....	.....	1,138 50	6
.....	383,916 82	.....	1,240,628 96	.....	1,715,309 37	.....	2,389,544 21	4,131,396 60	10,646,249 18	.....

YEARLY Expenditure on CANALS

STAFF, RE

NOVA

Number.	Name of Work.	Year ended							
		1868.		1869.		1870.		1871.	
			\$ cts.		\$ cts.		\$ cts.	I.	\$ cts.
1	St. Peter's—								
2	Staff							281	225 36
3	Repairs							281	555 78
4	Totals								781 14
									6,402 07

QUE

		I.		I.		I.		I.		II.	
1	Lachine—										
2	Collection	203	10,745 35	236	10,539 79	291	9,670 41	279	9,440 82	330	8,654 19
3	Staff	203									
4	Repairs	63	13,742 05	236	14,209 02	291	15,834 49	279	17,478 52	330	16,076 93
5	Refunds	III.	10,431 51	236	12,085 84	291	13,302 39	279	15,093 25	330	12,334 68
6	Totals			244	101 08						
7			34,918 91		36,935 73		38,807 29		42,012 59		37,065 80
8	Beauharnois—										
9	Collection	I.									
10	Staff	202	776 08	235	789 73	289	776 32	277	785 42	330	796 51
11	Repairs	202									
12	Refunds	III.	9,349 99	235	9,626 99	289	10,117 57	277	12,316 53	330	11,792 40
13	Totals	62	6,216 98	235	6,498 57	290	6,384 81	277	5,722 36	331	15,733 38
14			16,343 05		16,915 29		17,278 70		18,824 31		28,322 38
15	Ste. Anne's Lock—										
16	Collection	I.									
17	Staff	206	654 20	239	652 29	293	654 94	281	720 01	334	726 71
18	Repairs	206									
19	Refunds	III.	778 16	239	1,062 96	293	1,136 54	282	1,285 84	334	1,106 89
20	Totals	65	432 47	239	1,873 51	293	1,280 36	282	1,539 02	334	1,393 61
21			1,864 83		3,589 76		3,071 84		3,544 87		3,227 21
22	Carillon and Grenville—										
23	Collection	I.									
24	Staff	206	65 12	239	78 29	293	83 63	281	740 40	333	542 61
25	Repairs	206									
26	Refunds	III.	6,301 88	239	6,549 38	293	6,617 81	281	8,676 90	333	8,324 51
27	Totals	64	8,911 28	239	10,157 42	293	9,852 09	281	8,218 24	333	17,235 81
28			15,278 28		16,785 09		16,553 53		17,635 54		26,102 41

for the undermentioned years.

PAIRS, &c.

SCOTIA.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
219	343 32	202	725 93	255	560 00	282	641 55	264	600 00	3,376 16	1
220	6,539 58	202	1,558 57	255	889 35	282	.....	264	17 45	15,682 80	2
.....	6,882 90	.....	2,284 50	.....	1,449 35	.....	641 55	....	617 45	19,058 96	

6

BEC.

II.		II.		II.		II.		II.			
216	8,852 93	200	9,040 38	253	9,306 62	280	9,218 11	262	9,855 53	95,324 12	1
217	23,601 03	200	25,811 07	253	28,592 01	280	33,797 73	292	33,148 86	222,291 71	2
217	34,300 60	200	22,828 66	253	30,057 34	280	29,103 65	262	19,824 33	199,362 26	3
.....	.....	208	156 79	262	111 80	287	30 78	368	250 12	650 57	4
.....	66,754 56	.....	57,836 90	.....	68,067 77	.....	72,150 27	.....	63,078 84	517,628 66	
217	896 47	199	896 78	252	901 49	280	1,135 03	261	1,094 80	8,848 63	5
217	12,210 73	199	15,392 51	252	14,399 32	280	14,465 86	261	14,377 63	124,049 59	6
217	9,882 06	200	10,990 56	252	12,253 01	280	17,170 83	261	15,207 26	106,059 92	7
.....	.....	.....	.....	.....	.....	287	65 02	.....	.....	65 02	8
.....	22,989 26	.....	27,279 85	.....	27,553 82	.....	32,836 74	.....	30,679 79	239,023 16	
219	918 83	202	874 34	255	894 40	282	922 44	264	949 07	7,967 30	9
219	2,199 64	202	2,614 90	255	1,859 20	282	1,952 14	264	1,982 65	15,978 83	10
219	1,264 40	202	7,208 63	255	4,506 68	282	4,033 72	264	1,756 93	25,289 35	11
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
.....	4,382 87	.....	10,697 87	.....	7,260 28	.....	6,908 30	.....	4,688 65	49,235 48	
219	899 15	201	1,206 82	254	1,046 03	282	1,494 91	263	1,279 28	7,436 24	13
219	10,068 28	201	10,710 88	254	10,378 57	282	10,764 38	263	11,050 27	89,442 86	14
219	8,781 50	201	10,605 82	255	18,520 44	282	11,475 96	263	10,304 06	114,062 12	15
.....	.....	.....	.....	.....	.....	.....	.....	268	703 58	703 58	16
.....	19,748 93	.....	22,523 52	.....	29,945 04	.....	23,735 25	.....	23,337 19	211,644 80	

YEARLY Expenditure on CANAL

STAFF, R

QUEBEC

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
17	St. Ours Lock— Collection.....	207 207 III.	403 22	239	408 68	294	406 77	282	434 36	334	400
18	Staff.....	65	1,532 75	239	1,755 15	294	1,458 09	282	1,414 48	334	1,565
19	Repairs.....	65	753 74	240	1,399 18	294	1,006 22	282	1,210 98	334	1,263
20	Refunds.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	2,689 71	.....	3,563 01	.....	2,871 08	.....	3,059 82	.....	3,229
21	Chambly— Collection.....	205 208 III.	1,810 92	237	1,854 40	292	1,802 40	279	2,266 14	332	2,193
22	Staff.....	64	8,312 90	237	8,437 22	292	8,931 41	280	10,214 71	332	9,628
23	Repairs.....	64	9,355 70	238	13,120 97	292	20,180 73	280	22,426 33	332	22,327
24	Refunds.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	19,479 52	.....	23,412 59	.....	30,917 54	.....	34,907 18	.....	34,149
	Grand Totals...	.....	90,574 30	.....	101,200 47	.....	109,499 98	.....	119,984 31	.....	132,096

ONA

1	Welland— Collection.....	I. 201 III.	6,087 41	I. 234	5,964 99	I. 288	6,062 10	I. 276	6,593 39	II. 328	6,351
2	Staff.....	62	37,679 05	234	39,060 61	289	40,340 45	276	42,383 33	328	37,085
3	Repairs.....	62	38,852 96	235	50,773 03	297	65,009 19	277	53,381 02	329	50,276
4	Refunds.....	211	32 40	244	206 73	298	207 38	.....	.....	.....	.....
	Totals.....	.....	82,651 82	.....	96,005 36	.....	111,619 12	.....	102,357 74	.....	93,713
5	Cornwall— Collection.....	I. 202 III.	650 25	235	647 50	290	643 85	277	657 21	331	672
6	Staff.....	63	11,244 47	235	10,347 91	290	10,368 16	277	11,848 39	331	10,594
7	Repairs.....	63	3,774 18	235	3,859 14	290	7,145 42	278	8,891 61	331	8,162
8	Refunds.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	15,668 90	.....	14,854 55	.....	18,157 43	.....	21,397 21	.....	19,430

for the undermentioned years—*Continued.*

PAIRS, &c.—*Continued.*

Concluded.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.		
219	543 60	202	502 26	255	523 00	283	523 70	264	519 57	4,665 33	17
219	2,076 50	202	2,219 13	255	1,362 22	283	1,403 92	264	1,533 40	16,321 44	18
219	1,575 10	202	2,363 42	255	1,245 69	283	1,601 71	264	750 80	13,170 03	19
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
.....	4,195 20	.....	5,084 81	.....	3,130 91	.....	3,529 33	.....	2,803 77	34,156 80	
.....	
218	2,420 92	201	2,336 62	254	2,358 22	281	2,352 84	263	2,458 41	21,854 06	21
218	10,390 44	201	11,675 67	254	12,201 99	281	10,593 14	263	10,281 78	100,670 76	22
218	11,789 27	201	16,427 19	254	16,306 91	281	13,273 56	263	10,111 32	155,319 97	23
.....	.....	.....	.....	262	12 50	288	10 62	.....	.....	23 12	24
.....	24,600 63	.....	30,439 48	....	30,879 62	.....	26,230 16	.....	22,851 51	277,867 91	
.....	142,671 45	.....	153,862 43	.....	166,837 44	.....	165,390 05	.....	147,439 75	1,329,556 81	

RIO.

II.		II.		II.		II.		II.			
215	6,663 59	199	6,591 37	251	6,209 72	279	6,620 13	261	6,527 09	63,670 94	1
215	45,382 99	199	50,966 48	251	52,595 00	279	57,623 31	261	59,963 47	463,080 06	2
216	66,550 73	199	103,666 99	252	88,539 99	279	81,376 12	261	49,783 93	648,210 86	3
.....	.....	208	1,371 75	262	1,798 92	287	2,505 17	268	697 26	6,819 61	4
.....	118,597 31	.....	162,596 59	.....	149,143 63	.....	148,124 73	.....	116,971 75	1,181,781 47	
217	904 82	200	867 39	253	868 67	281	942 45	262	1,200 50	8,064 35	5
217	13,042 25	200	13,405 20	253	13,351 91	281	13,320 61	262	13,375 70	120,898 90	6
217	12,467 65	200	7,610 70	253	7,097 34	281	6,423 67	262	6,440 54	71,873 95	7
.....	.....	.....	.....	.....	.....	287	65 02	268	94 40	159 42	8
.....	26,414 72	.....	21,883 29	.....	21,317 92	.....	20,751 75	.....	21,120 14	200,996 62	

YEARLY Expenditure on CANALS

STAFF, R.
ONTARIO

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
9	Williamsburgh— Collection	203	1,125 00	237	1,125 00	290	1,125 00	278	1,150 00	331	1,150 00
10	Staff	204 III. 63	5,745 97	237	5,769 81	291	5,573 13	278	6,382 17	331	5,542 00
11	Repairs	204 III. 63	6,442 41	237	5,670 88	291	6,546 16	278	5,308 41	331	3,230 00
12	Refunds .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals .....	.....	13,313 38	.....	12,565 69	.....	13,244 29	.....	12,840 58	.....	9,923 00
13	Burlington Bay— Ferryman, &c....	I. 204	500 00	237	500 00	291	500 00	279	479 70	332	373 00
14	Repairs	204	57 32	237	577 94	292	47 27	279	94 69	332	1,014 00
15	Refunds	211	5 10	.....	.....	.....	.....	.....	.....	.....	.....
	Totals .....	.....	562 42	.....	1,077 94	.....	547 27	.....	574 39	.....	1,387 00
16	Rideau— Collection	205 III. 64	371 90	238	377 72	293	343 42	280	1,403 17	333	1,245 00
17	Staff	64	18,397 28	238	19,250 71	293	20,022 37	280	22,814 58	333	22,139 00
18	Repairs	64	16,475 21	238	13,140 77	293	19,469 33	280	18,120 52	333	14,005 00
19	Refunds .....	.....	10 42	244	288 46	.....	.....	.....	.....	.....	.....
	Totals .....	.....	35,244 81	.....	33,057 66	.....	39,835 12	.....	42,338 27	.....	37,390 00
	Grand Totals..	.....	147,441 33	.....	157,561 20	.....	183,403 23	.....	179,508 19	.....	161,845 00

MISCELLANEOUS

1	Miscellaneous on Canals	211 III. 68	8,205 51	244	3,203 51	298	8,583 48	231 285 286	2,109 71	334 337 338	1,890 00
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ABSTRACT STATEMENT OF EXPENDITURE

1	Nova Scotia	781 14	6,400 00
2	Quebec	90,574 30	101,200 47	109,499 98	119,984 31	132,090 00
3	Ontario .....	.....	147,441 33	.....	157,561 20	.....	183,403 23	.....	179,508 19	.....	161,845 00
4	Miscellaneous .....	.....	8,205 51	.....	3,203 51	.....	8,583 48	.....	2,109 71	.....	1,890 00
	Totals .....	.....	246,221 14	.....	261,965 18	.....	301,486 69	.....	302,383 35	.....	302,240 00

for the undermentioned years—*Concluded.*

PAIRS, &c.—*Concluded.*

Concluded.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
I.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
218	1,175 00	201	1,175 00	253	1,175 00	281	1,175 00	263	1,150 00	11,525 00	9
218	6,424 49	201	6,857 19	253	6,547 62	281	7,418 39	263	7,388 08	63,649 79	10
218	7,347 75	201	7,395 92	253	4,110 29	281	11,690 98	263	10,053 61	67,796 48	11
.....	.....	.....	.....	.....	.....	287	65 01	.....	.....	65 01	12
.....	14,947 24	.....	15,428 11	.....	11,832 91	.....	20,349 38	.....	18,591 69	143,036 28	
218	300 00	201	300 00	255	300 00	.....	.....	263	303 78	3,556 87	13
.....	.....	208	56 91	255	369 05	282	1,490 86	263	489 34	4,140 74	14
.....	.....	.....	.....	.....	.....	.....	.....	268	13 40	75 41	15
.....	300 00	.....	356 91	.....	669 05	.....	1,490 86	.....	806 52	7,773 02	
18	1,459 35	198	1,933 89	250	2,227 85	278	2,089 16	260	2,122 69	13,574 73	16
19	22,841 51	198	26,815 44	250	26,553 37	278	26,430 77	260	25,959 56	231,225 07	17
19	26,074 49	198	22,957 40	250	19,699 81	278	14,428 25	260	14,198 18	178,569 28	18
.....	.....	208	105 48	.....	.....	288	17 67	.....	.....	412 03	19
.....	50,375 35	.....	51,812 21	.....	48,481 03	.....	42,965 85	.....	42,280 43	423,781 11	
.....	210,634 62	.....	252,077 11	.....	231,444 54	.....	233,682 57	.....	199,770 53	1,957,368 50	

N CANALS.

20		203		255		283		264			
23	8,152 45	208	6,546 96	256	2,145 90	288	3,193 23	268	3,098 46	47,136 05	1

ATURE ON CANALS—STAFF, &c.

.....	6,882 90	.....	2,284 50	.....	1,449 35	.....	641 55	.....	617 45	19,058 96	1
.....	142,671 45	.....	153,862 43	.....	166,837 44	.....	165,390 05	.....	147,439 75	1,329,556 81	2
.....	210,634 62	.....	252,077 11	.....	231,444 54	.....	233,682 57	.....	199,770 53	1,957,368 50	3
.....	8,152 45	.....	6,546 96	.....	2,145 90	.....	3,193 23	.....	3,098 46	47,136 05	4
.....	368,341 42	.....	414,771 00	.....	401,877 23	.....	402,907 40	.....	350,926 19	3,353,120 32	

YEARLY Expenditure on PUBLIC BUILDINGS

CONSTRUCTION

NOVA

Number.	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	I. \$ cts.	II. \$ cts.
1	Halifax Dominion Buildings.....					248 84,000
2	Halifax Quarantine Station (Lawlor's Island)				197 7,786 67	255 3,075
3	Pictou Custom House.....					
4	Pictou Quarantine Station.....					
5	Sydney Marine Hospital.....					
6	Sydney Quarantine Station.....					
7	Yarmouth Marine Hospital.....					
8	Yarmouth Quarantine Station.....					
	Totals.....				7,786 67	87,075

PRINCE ED

1	Charlottetown Dominion Buildings.....					
2	Souris Marine Hospital.....					
	Totals					

NE

1	Chatham Custom House.....					
2	Dorchester Penitentiary.....					
3	Middle Island or Miramichi Quarantine Station					
4	Newcastle Custom House.....					
5	St. Andrew's Marine Hospital.....					
6	do Quarantine St'n.....					
7	St. John Custom House.....				197 203 75,797 88	
8	do Post Office.....					254 14,206
9	do Quarantine St'n Partridge Is'd					255 3,998
10	do Savings Bank.....					253 26,853
11	Westcock Marine Hospital.....					
	Totals				75,797 88	45,058

* Destroyed by fire on 20th June, 1877.

or the undermentioned years.

ION.

COTIA.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
I.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
										84,000 00	1
148	11,429 65	180	2,650 00							24,941 44	2
150	4 50	179	274 75	228	3,330 33	257	14,086 00	245	7,364 47	25,060 05	3
		180	4,090 00							4,090 00	4
				229	157 45	258	6,995 52	244	2,123 60	9,276 57	5
				229	16 95					16 95	6
				229	3,000 00			244	550 00	3,550 00	7
				229	3,180 00	258	152 12			3,332 12	8
	11,434 15		7,014 75		9,684 73		21,233 64		10,038 07	154,267 13	

RD ISLAND.

		183	69,000 00	.....	.....	.....	.....	.....	69,000 00	1	
				237	3 00	258	3,574 87	245	807 75	4,385 62	2
			69,000 00	.....	3 00	.....	3,574 87	.....	807 75	73,385 62	

RUNSWICK.

149	10,060 00	178	1,538 70	228	1,393 07	.....	.....	.....	.....	12,991 77	1
						260	21,860 00	247	20,294 22	42,154 22	2
149	1,118 40	181	3,044 80	228	10 50	.....	.....	.....	.....	4,173 70	3
....	4,000 00	178	830 00	.....	.....	.....	.....	.....	.....	4,830 00	4
		181	4,565 58	227	1,022 86	.....	.....	.....	.....	5,588 44	5
			330 00	.....	.....	.....	.....	.....	.....	330 00	6
										75,797 88	7
148	7,860 99	180	46,988 50	227	78,495 30	257	27,243 37	245	4,146 31	178,940 86	8
149	2,555 70	181	362 45	228	392 13	.....	.....	.....	.....	7,308 46	9
148	6,472 67	180	14,457 79	.....	.....	.....	.....	.....	.....	47,784 28	10
		181	3,200 00	227	216 93	.....	.....	.....	.....	3,416 93	11
	32,067 76	.....	75,317 82	.....	81,530 79	.....	49,103 37	.....	24,440 53	383,316 54	

YEARLY Expenditure on PUBLIC BUILDINGS

CONSTRUCTED

QUEBEC

Number.	Name of Work.	Year ended									
		1868.		1869		1870.		1871.		1872.	
		I.	\$ cts.	III.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Argenteuil Court House.....			14	1,377 20						
2	Beauharnois Jail....			14	178 66						
		98									
3	Grosse Isle Quarantine Station.....	III.								255	6,823 9
4	Kamouraska Jail....	41	2,501 90								
5	Lévis Immigrant Shed.....			14	61 80						
										255	13,108 6
6	Malbaie Court House and Jail....	III.									
		81	228 50								
7	Montreal Custom House (new).....							197 199			
8	do Examining Warehouse ...					183	75 00	202	216,109 63		
9	do Immigrant Shed.....									255	4,559 1
10	do Post Office.....									253	150,136 1
11	do Purchase of Land.....									256	
						181	9,926 98	199	4,730 60	258	6,310 5
12	Quebec Custom House (new).....	III.									
		124 47	1,331 60								
13	do Marine Hospital.....										
14	do New Jail.....	III.									
15	do Observatory (re-building).....	81	2,687 25								
16	do Post Office (new).....							197	22,183 38	252	32,715
17	Sherbrooke Immigrant Station.....										
18	do New Jail.....	III.		III.		III.		204 III.			
		81	4,257 20	14	500 00	10	1,227 19	3	849 24		
19	St. Vincent de Paul Penitentiary.....									256	110,000
20	Three Rivers Custom House.....	45	1,898 15								
	Totals.....		12,904 60		2,117 66		11,229 17		243,872 85		323,654

for the undermentioned years—*Continued.*

TION.

BEC.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,377 20	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	178 66	2
147	3,132 06	179	6,297 71	225	1,661 85	255	10,695 90	243	3,671 68	34,785 01	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61 80	4
147	3,957 94	179	3,401 61	.....	.....	.....	.....	.....	.....	20,468 20	5
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	228 50	6
.....	.....	.....	.....	226	3,426 13	.....	.....	.....	.....	219,610 76	7
.....	.....	.....	.....	227	203 41	256	74,843 51	244	110,229 15	185,276 07	8
.....	.....	.....	.....	226	.....	.....	.....	.....	.....	17,811 15	9
147	2,993 69	179	2,715 00	231	7,543 30	.....	.....	.....	.....	460,426 38	10
147	49,030 59	179	59,985 98	226	129,490 57	236	71,783 14	.....	.....	.....	.....
146	.....	.....	.....	.....	.....	.....	.....	.....	.....	105,724 56	11
149	81,208 50	183	3,547 95	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	225	.....	.....	.....	.....	.....	1,331 60	12
.....	.....	.....	.....	335	7,004 86	255	2,003 49	.....	.....	9,008 35	13
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,687 25	14
.....	.....	98	6,968 89	225	1,798 87	.....	.....	.....	.....	8,767 76	15
146	16,712 81	178	16,940 76	225	.....	.....	.....	244	11,186 95	105,088 40	16
147	1,000 00	179	334 40	235	5,348 80	.....	.....	.....	.....	1,334 40	17
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,833 63	18
.....	.....	.....	.....	99	.....	.....	.....	.....	.....	122,531 54	19
.....	.....	.....	.....	100	649 13	260	4,076 87	247	5,907 39	10,534 68	20
.....	.....	179	2,552 95	226	7,981 73	.....	.....	.....	.....	.....	.....
.....	158,025 59	.....	102,745 25	.....	165,108 65	.....	163,402 91	.....	130,995 17	1,314,065 90	.....

YEARLY Expenditure on PUBLIC BUILDINGS

CONSTRUCTED

ONTARIO

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	\$ cts.	III.	\$ cts.	I. 180 III.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Algoma Court House and Jail...	45	207 20	6	1,608 94	3	3,224 99	.....	.....	.....	.....
2	Guelph Custom House, &c. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	Hamilton Post Office	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Kingston Immigrant Buildings....	.....	.....	.....	.....	.....	.....	.....	.....	255	4,024 00
5	do Military Buildings and Fortifications. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	do Military College	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	London Custom House.....	.....	.....	.....	.....	.....	.....	197	19,282 90	254	11,119 8
8	do Immigrant Shed	.....	.....	.....	.....	.....	.....	197	3,000 00	.....	.....
9	do Post Office.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	Ottawa Parliament and Departmental Buildings.....	I. 121 III.	.....	I. 155 III.	.....	.....	.....	.....	.....	.....	.....
11	do Post Office and Custom House &c.	44	41,689 63	6	16,548 29	178	39,921 19	193	43,257 16	248	68,745 5
		.....	.....	.....	.....	.....	.....	.....	.....	253	90 0
12	Rideau Hall.	I. 124 III.	.....	I.	.....	I.	.....	.....	.....	.....	.....
13	Toronto Custom House (new).	47	51,029 10	157	93,178 85	182	11,757 79	.....	.....	.....	.....
14	do Examining Warehouse...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	do Immigrant Sheds. ....	.....	.....	.....	.....	181	7,381 58	197	3,976 86	.....	.....
16	do Post Office (new). ....	.....	.....	.....	.....	.....	.....	197	13,126 73	253	37,224 0
17	St. Catharines Marine Hospital.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals. ....	.....	92,925 93	.....	111,336 08	.....	62,285 55	.....	82,643 65	.....	121,203 4

MA

1	Stoney Mountain Penitentiary.....	.....	.....	.....	.....	.....	.....	.....	.....	II.	.....
2	Winnipeg Custom House, &c. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	Winnipeg Immigration Station..	.....	.....	.....	.....	.....	.....	.....	.....	255	308
	Totals. ....	.....	.....	.....	.....	.....	.....	.....	.....	.....	308

for the undermentioned years—*Continued.*

TION—*Continued.*

RIO.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
										5,041 13	1
								242	13,111 74	13,111 74	2
		177	9,295 72	223	6,173 60	252 264	2,039 35			17,508 67	3
										4,024 08	4
				143	29,514 10	254 255	53,320 19 5,643 05	243	18,888 86 14,840 93	101,723 15 20,483 98	5 6
147	12,831 48	178	10,349 26							53,583 46	7
148	2,012 80	178	3,420 00	223	1,989 34	264	3 72			7,425 86	8
147	268 17			223	3,500 00					6,768 17	9
136 137	99,517 00	168	135,963 72	201	189,484 11	206	267,839 73	196	258,833 09	1,161,799 44	10
146	24,036 46	176	46,169 18	224	69,377 60	253	72,704 59	243 250	18,451 24	230,829 07	11
										155,965 74	12
146	40,051 48	177	55,141 94	223	65,357 64	253	31,694 06	242	41,939 18	234,184 30	13
				223	40,579 42		149,562 41	241	33,196 87	223,338 70	14
				224	475 74					11,834 18	15
146	25,954 15	177	34,534 85	224	5,933 21	263 276	9,338 54	251	2,346 72	128,458 20	16
						255	2,000 00			2,000 00	17
	204,671 54		294,874 67		412,384 76		594,145 64		401,608 63	2,378,079 87	

TOBA.

II.		II.		II.		II.		II.			
		181	51 22	229	35,752 28	260	60,597 29	247	39,791 04	136,191 74	1
148	109 57	181	6,724 66	229	27,503 59	259	40,092 49	245	5,057 98	79,488 29	2
148	6,742 58									7,050 58	3
	6,852 15		6,775 88		63,255 87		100,689 69		44,849 02	222,730 61	

YEARLY Expenditure on PUBLIC BUILDINGS

CONSTRUCTED

NORTH WEST

Number.	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Battleford Buildings .....	.....	.....	.....	.....	.....
2	Fort Pelly Barracks .....	.....	.....	.....	.....	.....
3	do Government House.....	.....	.....	.....	.....	.....
4	Buildings at Forts MacLeod, Walsh and Calgary.....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	.....	.....

BRITISH

1	New Westminster Penitentiary.....	.....	.....	.....	.....	.....
2	Victoria Custom House, &c.....	.....	.....	.....	.....	.....
3	do Marine Hospital .....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	.....	.....

PUBLIC BUILDING

	I.							II.	
1 Public Buildings Generally	122	130 18	.....	.....	.....	.....	.....	256	1,637 8

ABSTRACT STATEMENT of Expenditure on

1	Nova Scotia.....	.....	.....	.....	.....	7,786 67	.....	87,075
2	P. E. Island.....	.....	.....	.....	.....	.....	.....	45,058
3	New Brunswick.....	.....	.....	.....	.....	75,797 88	.....	323,654
4	Quebec.....	12,904 60	2,117 66	.....	11,229 17	243,872 85	.....	121,203
5	Ontario.....	92,925 93	111,336 08	.....	62,285 55	82,643 65	.....	308
6	Manitoba.....	.....	.....	.....	.....	.....	.....	.....
7	N.-W. Territories.....	.....	.....	.....	.....	.....	.....	.....
8	British Columbia.....	.....	.....	.....	.....	.....	.....	.....
9	Public Buildings Generally .....	.....	130 18	.....	.....	.....	.....	1,637
	Totals.....	105,960 71	113,453 74	.....	73,514 72	410,101 05	.....	578,936

for the undermentioned years—*Continued.*

TION—*Concluded.*

TERRITORIES.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
	\$ cts		\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	230	29,320 91	259	8,000 00	246	55,412 12	63,412 12	1
.....			259	33,966 94	246	15,000 00	78,287 85	2
.....								3
.....								4
.....	29,320 91	.....	41,966 94	.....	70,412 12	141,699 97	

COLUMBIA.

II.		II.		II.		II.		II.			
.....	.....	182	136 72	231	1,571 98	260	78,114 79	248	47,218 11	127,041 60	1
149	6,456 37	182	22,844 88	230	20,311 86	259	14,731 83	.....	.....	64,344 94	2
149	182 00	182	15,474 57	231	2,978 86	.....	.....	.....	.....	18,635 43	3
.....	6,638 37	.....	38,456 17	.....	24,862 70	.....	92,846 62	.....	47,218 11	210,021 97	

GENERALLY.

II.		II.		II.		II.		II.			
149	2,330 55	183	6,778 19	236	14,660 97	263	8,519 56	247	5,870 89	39,928 16	1

PUBLIC BUILDINGS—Construction.

.....	11,434 15	.....	7,014 75	.....	9,684 73	.....	21,233 64	.....	10,038 07	154,267 13	1
.....	.....	.....	69,000 00	.....	3 00	.....	3,574 87	.....	807 75	73,385 62	2
.....	32,067 76	.....	75,317 82	.....	81,530 79	.....	49,103 37	.....	24,440 53	383,316 54	3
.....	158,035 59	.....	102,745 25	.....	165,108 65	.....	163,402 91	.....	130,995 17	1,314,065 90	4
.....	204,671 54	.....	294,874 67	.....	412,384 76	.....	594,145 64	.....	401,608 63	2,378,079 87	5
.....	6,852 15	.....	6,775 88	.....	63,255 87	.....	100,689 69	.....	44,849 02	222,730 61	6
.....	.....	.....	.....	.....	29,320 91	.....	41,966 94	.....	70,412 12	141,699 97	7
.....	6,638 37	.....	38,456 17	.....	24,862 70	.....	92,846 62	.....	47,218 11	210,021 97	8
.....	2,330 55	.....	6,778 19	.....	14,660 97	.....	8,519 56	.....	5,870 89	39,928 16	9
.....	422,030 11	.....	600,962 73	.....	800,812 38	.....	1,075,483 24	.....	736,240 29	4,917,495 77	

YEARLY Expenditure on PUBLIC BUILDINGS

REP

NOVA

Number.	Name of Work.	Year ended					
		1868.		1869.		1870.	
		1871.		1872.			
		\$ cts.		\$ cts.		\$ cts.	
1	Halifax Dominion Building						
2	do Drill Shed.....						
3	do Penitentiary.....						
4	do Quarantine St'n (Lawlor's Island).....						
5	Pictou Quarantine Station						
6	Yarmouth Quarantine Station.....						
	Totals						14,094 38

PRINCE ED

1	Charlottetown Dominion Building.. ..								
---	--------------------------------------	--	--	--	--	--	--	--	--

NEW

1	Fredericton Custom House.....								
2	Newcastle Custom House.....								
3	St. John Barracks...								
4	do Custom House.. ..							259	10,465 10
5	do Penitentiary ...								
6	do Post Office (old)								
7	do Quarantine St'n (Partridge Island).....								
8	do Savings Bank.. ..							259	30 00
9	Westcock Marine Hospital.....								
	Totals								10,495 10

for the undermentioned years—*Continued.*

AIRS.

SCOTIA.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
155	7,702 41	187	4,529 90	236	8,309 90	265	7,754 05	252	1,851 38	44,242 02	1
.....	.....	183	164 00	.....	.....	.....	.....	.....	.....	164 00	2
.....	.....	.....	.....	.....	.....	261	308 97	.....	.....	308 97	3
.....	.....	.....	.....	228	528 20	253	1,010 00	245	228 00	1,766 20	4
.....	.....	.....	.....	228	250 00	265	408 82	.....	.....	658 82	5
.....	.....	.....	.....	.....	.....	.....	.....	252	35 00	35 00	6
.....	7,702 41	4,693 90	9,088 10	9,481 84	2,114 38	47,175 01	

WARD ISLAND.

.....	187	200 00	237	2,920 89	265	1,341 10	253	5,464 89	9,926 88	1
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BRUNSWICK.

.....	187	612 41	612 41	1
.....	265	90 00	252	450 00	540 00	2
.....	142	396 78	396 78	3
154	227	257
155	3,853 58	187	4,605 37	237	4,401 65	265	3,865 57	252	576 28	27,767 60	4
.....	.....	.....	.....	.....	.....	261	151 33	248	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	251	370 85	522 18	5
.....	.....	.....	.....	.....	.....	.....	.....	252	800 00	800 00	6
.....
.....	.....	.....	.....	.....	.....	.....	.....	252	28 00	28 00	7
.....	.....	.....	.....	237	387 82	.....	.....	.....	.....	417 82	8
.....	.....	.....	.....	.....	.....	265	1,797 44	.....	.....	1,797 44	9
.....	3,853 58	.....	5,217 78	.....	5,186 25	.....	5,904 34	.....	2,225 13	32,882 23	

YEARLY Expenditure on PUBLIC BUILDINGS

REPAIRS—
QUE

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	\$ cts.	I.	\$ cts.	III.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Argenteuil Court House.....	83	600 00	.....	.....	.....	.....	.....	.....	.....	.....
2	Court Houses and Jails.....	135	30 00	.....	.....	.....	.....	.....	.....	.....	.....
3	Dundee Custom House.....	.....	.....	.....	.....	.....	.....	202	60 00	.....	.....
4	Grosse Isle Quarantine Station.....	.....	.....	161	34 95	.....	.....	.....	.....	255	949 1
5	Industrie Court House and Jail ...	81	146 45	.....	.....	3	753 99	.....	.....	.....	.....
6	Isle aux Noix Fort Lennox Barracks.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	Kamouraska Jail ...	81	83 67	.....	.....	.....	.....	.....	.....	.....	.....
8	Lévis Fortifications.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Montreal Court House.....	80	198 00	.....	.....	.....	.....	.....	.....	.....	.....
10	do Custom House (old), now Inland Revenue Offices .....	.....	.....	.....	.....	.....	.....	202	100 00	258	5,032 8
11	do Custom House (new). .....	.....	.....	.....	.....	.....	.....	.....	.....	256 258 259	3,712 0
12	do Geological Museum.....	.....	.....	.....	.....	.....	.....	201	.....	258	.....
13	do Gov.-General's Office	46	80 00	.....	.....	.....	.....	202	2,016 09	259	1,257 0
14	do do Secretary's Office.....	47	7 55	.....	.....	.....	.....	.....	.....	.....	.....
15	do Government House (old)... ..	I. 122 124	98 10	160	30 00	I. 184 III. 3	88 03	.....	.....	.....	.....
16	do Lunatic Asylum.....	.....	.....	160	23 87	.....	.....	202	23 87	.....	.....
17	do Post Office (old)	124	456 37	.....	.....	I. 184	219 45	.....	.....	.....	.....
18	Quebec Bonner Property	122 III. 46	40 00	161	134 32	.....	.....	.....	.....	.....	.....
19	do Citadel Buildings .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	do Cullers' Office.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Carried forward..	.....	1,740 14	.....	223 14	.....	1,061 47	.....	2,199 96	.....	10,951

for the undermentioned years—*Continued.*

Continued.
BEC.

30th June.										Total for Ten years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.		\$ cts.	\$ cts.	
										600 00	1
										30 00	2
154	250 00									310 00	3
								251	876 06	1,860 13	4
										900 44	5
								250	8 00	8 00	6
										83 67	7
				142	4,681 96	256	765 32	243	3,242 41	8,689 69	8
										198 00	9
154	80 00	186	347 00	236	16 80	264	2,059 40	252	449 80	8,085 96	10
149 154	5,676 85	188	13,905 80	236	315 69	264	3,593 77	252	1,326 40	28,560 52	11
154	93 90					264	43 00			3,410 66	12
										80 00	13
										7 55	14
										216 13	15
154	23 87									71 61	16
										675 82	17
										174 32	18
149 154	10,493 23	186	14,845 25	235	621 04	263	1,003 02	251	794 46	27,757 00	19
		187	2,145 12			263	39 49	251	20 00	2,204 61	20
	16,617 85		31,243 17		5 665 49		7,504 00		6,717 13	83,924 11	

YEARLY Expenditure on PUBLIC BUILDINGS

REPAIRS—

QUEBEC—

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
	Brought forward.....		1,740 14		223 14		1,061 47		2,199 96		10,951 76
21	Quebec Custom House (old), now Immigration Office.....			161	68 38	183 184	1,413 51	201	28 00		
22	do Custom House (new).....							202	325 50	258 259	368 52
23	do Durham Terrace.....	46	148 00								
24	do Fortifications.....										
25	do Gov.-General's Office.....	I. 124	305 00								
26	do Inspector of Gas Office.....										
27	do Jail (new).....							IV. 3	193 66		
28	do Leased Buildings.....					184	1,913 00	3	50 66		
29	do Marine Hospital.....	124 III. 46	1,550 00	161	1,231 01	184	1,216 92				
30	do Observatory....	47	353 69	161	284 43						
31	do Old Chateau St. Louis.....	I. 122	75 00	160	75 00						
32	do Post Office (old).....	124	34 99			184	333 05				
33	do do (temp'ry).....							202	1,056 23	258	256 5
34	do do (new).....										
35	do Public Buildings.....	123 III. 46 47	2,647 47	160	10 40			202	300 00		
36	do Spencerwood..	I. 123 124 III. 46	1,472 26	161	2,803 87	183 184 185	2,640 18	202	20 82	256	22 8
37	Sorel Court House and Jail.....	81	78 34			III. 3	842 30				
38	St. Helen's Island Magazine.....										
39	St. Regis Custom House.....										
40	Three Rivers Custom House.....										
41	do Old Barracks.....										
	Totals.....		8,404 89		4,696 23		9,420 43		4,174 83		11,599 5

for the undermentioned years—*Continued.*

Continued.

Concluded.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.		\$ cts.	\$ cts.	
.....	16,617 85	.....	31,243 17	.....	5,665 49	.....	7,504 00	.....	6,717 13	83,924 11	
										1,509 89	21
154	2,591 89	186	5,157 95	235	3,221 69	263	1,195 85	251	34 60	12,896 00	22
				235	201 20					349 20	23
				142	11,724 76	256	14,592 23	243	2,685 19	29,002 18	24
										305 00	25
								251	1,173 49	1,173 49	26
										193 66	27
										1,963 66	28
154	385 00	187	1,973 35							6,356 28	29
154	49 42	186	14 09			263	13 92	251	10 00	725 55	30
										150 00	31
										368 04	32
										1,312 73	33
						263	3,054 41	251	1,079 36	4,133 77	34
						263	1,389 42	251	75 40	4,422 69	35
										6,959 93	36
										920 64	37
				142	97 50			251	184 50	282 00	38
154	89 90									89 90	39
						264	581 88			581 88	40
						264	76 95			76 95	41
...	19,734 06	...	38,388 56	.....	20,910 64	.....	28,408 66	.....	11,959 67	157,697 55	

YEARLY Expenditure on PUBLIC BUILDINGS

REPAIRS—

ONTA

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Hamilton Custom House.....	123	404 30	.....	.....	183 184	852 60	200	30 00	259	362 2
2	do Post Office.....	.....	.....	.....	.....	.....	.....	202	484 31	.....	.....
3	Kingston Custom House.....	123	52 31	160	100 00	.....	.....	200 202	1,728 40	.....	.....
4	do Immigrant Building.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	do Penitentiary....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	do Post Office.....	.....	.....	160	764 40	183	139 21	200 201	88 50	.....	.....
7	do Rockwood Asylum.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	London Custom House.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	do Drill Shed.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	do Post Office.....	.....	.....	.....	.....	.....	.....	201	207 70	254 259	441 0
11	Ottawa Major's Hill.....	.....	.....	.....	.....	183 183 184 185	93 00	200 201	441 67	.....	.....
12	Ottawa Parliament and Depart'l Buildings.....	122 123	19,816 56	159 160	27,359 88	III. 3	30,846 69	200 201 202	256 257 36,767 75	259	39,918
13	do Gas.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	do Heating.....	69 78	14,377 99	69 70 81 93 94	25,247 06	I. 182	26,535 02	199	26,389 30	253	36,028
15	do Snow.....	.....	.....	79 80	*641 50	.....	.....	.....	2,155 50	253	1,616
16	do Ventilation.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	do Post Office (old)	.....	.....	.....	.....	.....	.....	200 202	70 00	259	661
18	do Public Buildings, P. Office and Rideau Hall (water).....	122 III. 46	4,000 00	.....	.....	183 184	4,478 13	199 200 202	253 256 259	.....	4,879
19	do Rideau Hall....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Carried forward..	.....	38,651 16	.....	63 030 62	.....	62,944 65	.....	72,124 37	.....	83,907

* Departmental Buildings.

for the undermentioned years—*Continued.**Continued.*

RIO.

30th June.										Total for Ten Years, to 30th, June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
		46	102 90			264	1,781 61	251	35 00	3,568 66	1
				236	583 89			250	41 54	1,109 74	2
154	101 75	185	3,367 38	236	136 13	264	85 67	251	265 97	5,837 61	3
								251	248 22	248 22	4
						261	3,213 43	248 251	9,492 84	12,696 27	5
		185	2,821 42			264	14 45	351	149 11	3,977 09	6
								251	23 90	23 90	7
				236	105 25			251	1,007 00	1,112 25	8
								251	600 00	600 00	9
154	241 00	187	582 05			261	942 71	250	671 64	3,086 78	10
										534 67	11
159	48,198 03	185	80,096 79	234 232	117,640 84 * 6,323 20	262 266	84,170 55 12,000 00	249 253	97,735 13 18,000 00	582,550 45 36,323 20	12 13
153	37,975 40	187	40,308 67	232	40,331 54	265	45,408 21	253	40,000 00	332,601 33	14
155	1,383 90	188	996 77	232	641 40	266	598 40	253	548 80	8,582 27	15
		189	11,820 23							11,820 23	16
154	35 58									767 33	17
								252	4,500 00	4,500 00	18
153	62,378 27	185	50,464 28	235	39,150 58	263	36,506 92	250	35,991 28	250,528 12	19
	150,313 93		190,560 49		204,912 83		184,721 95		209,300 43	1,260,468 12	

YEARLY Expenditure on PUBLIC BUILDINGS

REPAIRS—
ONTARIO—

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts.	I	\$ cts.	I.	\$ cts.		\$ cts.	II.	\$ cts.
	Brought forward.....		38,651 16		63,030 62		62,944 65		72,124 37		83,907 69
20	Ottawa Rideau Hall Fuel and Light.....										
21	do do Snow.....					184	300 00			258	250 00
22	do Supreme Court (rent of rooms).....										
23	Toronto Custom House (temporary).....									256	940 20
24	do Examining Warehouse.....										
25	do Government Building.....	III.	45 267 55								
26	do Immigrant Sheds.....									255	372 50
27	do Inland Revenue Office.....										
28	do Magazine (old and new Forts).....										
29	do Post Office (new).....										
30	do do (old).....			160	400 00	184	632 93				
31	do Public Buildings.....			160	59 09						
32	do Savings Bank.....										
33	do Upper Canada Bank Building.....			160	241 30	184	77 50	200 202	45 45		
	Totals.....		38,918 71		63,731 01		63,955 08		72,169 82		85,470 40

MAN

1	Winnipeg Assistant Receiver-General's Office.....										
2	do Custom House.....										
3	do Finance Office.....										
4	do Fort Osborne Barracks.....										
5	do Immigrant Station.....										
6	do Lt.-Governor's Residence.....										
7	do Provost Prison.....										
	Totals.....										

for the undermentioned years—*Continued.*

Continue I.
Concluded.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II,	\$ cts.	II.	\$ cts.		
.....	150,313 93	.....	190,560 49	.....	204,912 83	.....	184,721 95	.....	209,300 43	1,260,468 12	
.....	.....	18 ^a	5,000 00	232	5,000 00	266	5,000 00	25	5,000 00	20,000 00	20
155	450 00	188	553 15	232	877 15	266	525 00	253	475 00	3,430 30	21
.....	.....	.....	.....	.....	.....	264	500 00	.....	.....	500 00	22
154	1,598 73	.....	.....	.....	.....	.....	.....	.....	.....	2,538 98	23
.....	.....	.....	.....	.....	.....	.....	.....	250	196 75	196 75	24
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	267 55	25
149	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
154	977 18	.....	.....	.....	.....	.....	.....	250	423 72	1,773 43	26
.....	.....	186	4,925 51	223	14,009 60	225	6,132 12	.....	.....	25,067 23	27
.....	.....	.....	.....	.....	.....	263	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	251	2,122 39	2,122 39	28
.....	.....	.....	.....	236	469 45	.....	.....	251	369 50	838 95	29
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,032 93	30
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59 (9	31
.....	.....	.....	.....	.....	.....	.....	.....	250	253 00	253 00	32
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	361 25	33
.....	153,329 84	.....	201,039 15	.....	225,269 03	.....	196,879 07	.....	218,140 79	1,318,912 97	

FOBA.

II.		II.		II.		II.		II.		
.....	.....	.....	.....	.....	265	600 00	253	600 00	1,200 00	1
.....	.....	.....	.....	.....	.....	.....	253	1,422 16	1,422 16	2
.....	.....	.....	237	778 08	.....	.....	.....	.....	778 08	3
.....	.....	.....	.....	.....	.....	.....	253	2,756 50	2,756 50	4
.....	.....	187	41 27	.....	.....	.....	.....	.....	41 27	5
155	2,000 00	183	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	187	9,808 25	237	10,316 94	.....	.....	.....	22,125 19	6
.....	.....	.....	.....	.....	.....	265	305 18	.....	305 18	7
.....	2,000 00	.....	9,849 52	.....	11,095 02	.....	905 18	.....	4,778 66	28,628 38

YEARLY Expenditure on PUBLIC BUILDINGS

REPAIRS—
NORTH-WEST

Number.	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Battleford Buildings .....	.....	.....	.....	.....	.....

BRITISH

1	New Westminster Custom House .....	.....	.....	.....	.....	.....	II. 371	175 00
2	do Post Office .....	.....	.....	.....	.....	.....	.....	.....
3	do Public Buildings .....	.....	.....	.....	.....	.....	.....	.....
4	do Marine Hospital .....	.....	.....	.....	.....	.....	.....	.....
5	do Post Office Saving Bank .....	.....	.....	.....	.....	.....	.....	.....
6	do Public Buildings .....	.....	.....	.....	.....	.....	.....	.....
	Totals .....	.....	.....	.....	.....	.....	.....	175 00

ABSTRACT STATEMENT of Expenditure on

1	Nova Scotia. ....	.....	.....	.....	.....	.....	.....	14,094 3
2	P. E. Island. ....	.....	.....	.....	.....	.....	.....	.....
3	New Brunswick. ....	.....	.....	.....	.....	.....	.....	10,495 1
4	Quebec.	8,404 89	4,696 23	9,420 43	4,174 83	.....	.....	11,599 5
5	Ontario.	38,918 71	63,731 01	63,955 08	72,169 82	.....	.....	85,470 4
6	Manitoba. ....	.....	.....	.....	.....	.....	.....	.....
7	N.-W. Territories. ....	.....	.....	.....	.....	.....	.....	.....
8	British Columbia. ....	.....	.....	.....	.....	.....	.....	175 0
9	Generally. ....	.....	.....	.....	.....	.....	.....	.....
	Totals	47,323 60	68,427 24	73,375 51	76,344 65	.....	.....	121,834 5

for the undermentioned years—*Concluded.*

Concluded.
TERRITORIES.

30th June.							Total for Ten Years to 30th June, 1877.	Number.
1873.	1874.		1875.		1876.		1877.	
\$ cts.	II.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
.....	187	100 00	.....	.....	.....	.....	100 00	1

COLUMBIA.

II.	II.	II.	II.	II.	II.	II.	II.		
.....	.....	236	639 50	.....	.....	.....	.....	844 50	1
.....	187	75 00	.....	.....	.....	.....	.....	75 00	2
.....	187	225 00	.....	.....	.....	.....	.....	225 00	3
.....	.....	.....	236	24 00	.....	.....	.....	24 00	4
.....	.....	.....	230	2,036 15	265	102 00	.....	2,138 15	5
155	535 86	.....	.....	.....	.....	.....	253	1,564 02	6
.....	535 86	.....	300 00	.....	2,729 65	.....	102 00	1,564 02	5,406 53

PUBLIC BUILDINGS—Repairs, &c.

.....	7,702 41	.....	4,693 90	.....	9,088 10	.....	9,481 84	.....	2,114 38	47,175 01	1
.....	.....	.....	200 00	.....	2,920 89	.....	1,341 10	.....	5,464 89	9,926 88	2
.....	3,853 58	.....	5,217 78	.....	5,186 25	.....	5,904 34	.....	2,225 13	32,882 23	3
.....	19,734 06	.....	38,388 56	.....	20,910 64	.....	28,408 66	.....	11,959 67	157,697 55	4
.....	153,339 84	.....	201,039 15	.....	225,269 03	.....	196,879 07	.....	218,140 79	1,318,912 97	5
.....	2,000 00	.....	9,849 52	.....	11,095 02	.....	905 18	.....	4,778 66	28,628 38	6
.....	.....	.....	100 00	.....	.....	.....	.....	.....	.....	100 00	7
.....	535 86	.....	300 00	.....	2,729 65	.....	102 00	.....	1,564 02	5,406 53	8
.....	655 00	.....	.....	.....	.....	.....	.....	.....	.....	655 00	9
.....	187,820 75	.....	259,788 91	.....	277,199 58	.....	243,022 19	.....	246,247 54	1,601,384 55	

YEARLY Expenditure on HARBOURS and

NOVA

Number.	Name of Work.	Year ended							
		1868.		1869.		1870.		1871.	
		\$	cts.	I.	\$	cts.	\$	cts.	II.
1	Arisaig Pier.....								
2	Big Pond, C.B.....								
3	Big Tracadie.....								
4	Broad Cove.....								
5	Canada Creek.....								
6	Cheverie.....								
7	Chipman's Brook...								
8	Church Point.....								
9	Cow Bay.....								
10	Cranberry Head.....								
11	Digby Pier.....			155	2,920	00			251
12	Gabarus, C.B.....								1,650
13	Green Cove.....								00
14	Harborville.....								
15	IngonishSouth, C.B.								
16	Joggins.....								
17	Jordan Bay.....								
18	L'Ardoise.....								
19	Lingan.....								
20	Liverpool(Brooklyn)								251
21	Mabou.....								55
									20
									250
									8,029
									38
22	Maitland Pier.....								
23	Margaree.....								
24	Margaretville.....								
25	Meteghan Cove.....								251
26	Morden Pier.....								1,650
27	Musquodoboit.....								00
28	McNair's Cove.....								
29	Oak Point (known as Kingsport).....								
30	Oyster Pond, Che- dabucto Bay.....								
31	Pictou Island.....								
32	Plympton.....								
33	Porsper's Pond, Che- dabucto Bay.....								
34	Port George.....								
35	do Greville.....								
36	do Hood.....								251
37	do Medway.....								750
38	do William (now Port Lorne).....								00
39	Saulnierville.....								
40	Tancook Island, Ma- honey Bay.....								
41	Trout Cove.....								
42	Tusket Island.....								
43	Yarmouth.....								
	Totals.....				2,920	00			12,158

BREAKWATERS for the undermentioned years.

SCOTIA.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
141	2,283 00	194	2,000 00	244	500 00	.....	.....	.....	.....	2,283 00	1
.....	.....	196	6,000 00	242	6,690 67	.....	.....	257	873 70	2,500 00	2
.....	.....	.....	.....	.....	.....	272	3,000 00	.....	.....	13,564 37	3
.....	.....	195	2,000 00	.....	.....	.....	.....	.....	.....	3,000 00	4
141	2,000 00	193	338 88	.....	.....	.....	.....	.....	.....	2,000 00	5
.....	.....	.....	.....	.....	.....	.....	.....	257	2,750 00	2,338 88	6
.....	.....	.....	.....	.....	.....	273	2,000 00	.....	.....	2,750 00	7
.....	.....	176	.....	.....	.....	.....	.....	.....	.....	2,000 00	8
.....	.....	193	10,004 96	244	25,000 00	271	46,458 95	256	8,656 13	90,120 04	9
.....	.....	.....	.....	.....	.....	273	2,000 00	.....	.....	2,000 00	10
.....	.....	194	2,500 00	.....	.....	.....	.....	.....	.....	7,070 00	11
.....	.....	194	2,000 00	.....	.....	.....	.....	.....	.....	2,000 00	12
.....	.....	194	2,500 00	.....	.....	.....	.....	.....	.....	2,500 00	13
.....	.....	.....	.....	.....	.....	272	2,000 00	.....	.....	2,000 00	14
141	11 50	193	5,717 00	244	35,891 10	271	17,926 00	257	24,851 60	84,397 20	15
.....	.....	193	10,000 00	.....	.....	.....	.....	.....	.....	10,000 00	16
.....	.....	.....	.....	243	5,103 79	271	17,465 00	.....	.....	22,568 79	17
.....	.....	.....	.....	.....	.....	272	97 21	257	10,228 29	10,325 50	18
.....	.....	.....	.....	.....	.....	.....	.....	257	2,000 00	2,000 00	19
140	9,417 50	192	22,016 25	243	17,897 80	271	8,933 96	.....	.....	58,320 77	20
140	39,401 86	192	22,078 50	243	2,092 25	271	10,088 16	259	1,750 00	83,440 15	21
.....	.....	.....	.....	.....	.....	285	.....	.....	.....	.....	.....
140	3,000 00	195	1,000 00	243	1,061 69	276	1,220 30	264	60 00	6,341 99	22
.....	.....	.....	.....	.....	.....	272	3,000 00	.....	.....	3,000 00	23
141	2,000 00	.....	.....	.....	.....	272	5,000 00	.....	.....	8,650 00	24
.....	.....	.....	.....	244	5,000 00	271	5,000 00	.....	.....	10,000 00	25
.....	.....	195	3,000 00	.....	.....	.....	.....	.....	.....	3,000 00	26
.....	.....	.....	.....	.....	.....	.....	.....	256	1,000 00	1,000 00	27
141	10,606 10	192	9,000 00	242	5,004 00	277	3,815 10	259	115 50	28,564 45	28
141	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
220	3,003 00	193	1,000 00	243	5,042 70	271	15,000 00	.....	.....	24,045 70	29
.....	.....	.....	.....	.....	.....	272	2,000 00	.....	.....	2,000 00	30
.....	.....	194	*	.....	.....	.....	.....	.....	.....	.....	31
.....	.....	193	2,343 97	244	1,200 00	.....	.....	.....	.....	3,543 97	32
.....
.....	.....	194	5,000 00	248	119 09	.....	.....	.....	.....	5,119 09	33
.....	.....	193	2,000 00	244	5,000 00	.....	.....	.....	.....	7,000 00	34
.....	.....	176	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	193	6,020 50	256	4 50	285	3 00	.....	.....	6,028 00	35
141	14,255 00	194	500 00	.....	.....	.....	.....	259	964 81	16,469 81	36
.....	.....	.....	.....	243	4,513 50	.....	.....	.....	.....	4,513 50	37
141	2,000 00	193	1,500 00	.....	.....	.....	.....	.....	.....	3,500 00	38
.....	.....	.....	.....	.....	.....	273	2,000 00	.....	.....	2,000 00	39
141	2,000 00	.....	.....	.....	.....	.....	.....	.....	.....	2,000 00	40
.....	.....	.....	.....	.....	.....	271	4,000 00	.....	.....	4,000 00	41
.....	.....	.....	.....	.....	.....	251	500 00	.....	.....	500 00	42
141	5,771 25	193	6,332 00	244	1,000 00	276	314 54	.....	.....	13,417 79	43
.....	95,749 21	.....	124,852 06	.....	121,121 09	.....	151,822 22	.....	53,250 03	561,873 00	.....

* 2,000 refunded.

YEARLY Expenditure on HARBOURS and

PRINCE EDW

Number.	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Colville Bay(Souris) .....	.....	.....	.....	.....	.....
2	New London .....	.....	.....	.....	.....	.....
3	Tignish.....	.....	.....	.....	.....	.....
	Totals. ....	.....	.....	.....	.....	.....

NEW

						I.	II.
1	Bathurst.....	.....	.....	.....	.....	.....	.....
2	Campo Bello. ....	.....	.....	.....	.....	.....	.....
3	Dipper Harbour.....	.....	.....	.....	.....	.....	.....
4	Grande Anse, Baie des Chaleurs .....	.....	.....	.....	.....	.....	.....
5	Herring Cove.....	.....	.....	.....	.....	.....	.....
6	Hillsboro', River Petitcodiac.....	.....	.....	.....	.....	.....	.....
7	Miramichi Tug Service.....	.....	.....	.....	.....	.....	.....
8	Pointe du Chêne, Shediac.....	.....	.....	.....	.....	.....	.....
9	Quaco, Bay of Fundy .....	.....	.....	.....	.....	.....	251 12 5
10	Richibucto .....	.....	.....	.....	.....	.....	.....
11	do Tug Service....	.....	.....	.....	195 4,000 00	251 2,000 00	.....
12	Sackville.....	.....	.....	.....	.....	.....	.....
13	Shippegan.....	.....	.....	.....	.....	.....	.....
14	St. John Harbour ..	.....	.....	.....	.....	.....	.....
15	Tynemouth.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	4,000 00	2,012	.....

BREAKWATERS for the undermentioned years—*Continued.*

ARD ISLAND.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
	\$ cts.		\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	245	8 00	273	20,000 00	257	19,871 33	39,879 33	1
.....	245	3,810 60	273	503 50	259	500 00	4,814 10	2
.....	245	2,010 60	273	4,557 50	257	4,750 00	11,318 10	3
.....	5,829 20	.....	25,061 00	.....	25,121 33	56,011 53	

BRUNSWICK.

II.		II.		II.		II.		II.			
.....	.....	.....	.....	241	3,876 43	.....	.....	.....	.....	3,876 43	1
.....	.....	195	1,000 00	.....	.....	270	600 00	.....	.....	1,600 00	2
.....	.....	195	10,000 00	241	11,960 72	269	279 00	.....	.....	22,239 72	3
.....	.....	.....	.....	.....	.....	270	3,000 00	259	998 98	3,998 98	4
142	9 70	195	13,100 00	242	3 75	.....	.....	.....	.....	13,113 45	5
.....	.....	196	1,500 00	241	1,500 00	.....	.....	.....	.....	3,000 00	6
142	2,000 00	148	2,000 00	.....	.....	.....	.....	.....	.....	4,000 00	7
.....	.....	.....	.....	241	7,354 87	269	7,228 37	.....	.....	14,583 24	8
142	18,865 25	.....	.....	.....	.....	.....	.....	.....	.....	18,877 84	9
142	1,125 70	195	5,956 75	241	15,936 50	270	10,853 42	255	1,621 44	35,493 81	10
42	2,000 00	148	2,500 00	179	2,500 00	.....	.....	.....	.....	13,000 00	11
.....	.....	.....	.....	248	.....	.....	.....	.....	.....	900 00	12
.....	.....	.....	.....	249	900 00	.....	.....	.....	.....	900 00	12
.....	.....	.....	.....	242	16 50	270	6,312 80	256	9,135 63	15,464 93	13
.....	.....	175	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	195	4,500 00	242	12,033 70	270	64,335 66	256	65,000 00	145,869 36	14
.....	.....	.....	.....	242	2,500 00	.....	.....	.....	.....	2,500 00	15
.....
.....	24,000 65	.....	40,556 75	.....	58,582 47	.....	92,609 25	.....	76,756 05	298,517 76	

YEARLY Expenditure on HARBOURS and
QUE

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Amherst Pier.....	.....	.....	.....	.....	180	600 00	195	1,750 87	250	2,427 68
2	Bagotville Pier, River Saguenay..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	Baie St. Paul Pier..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Berthier Pier.....	210	4 00	.....	.....	.....	.....	285	415 00	.....	.....
5	Chicoutimi River, Saguenay Pier....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	Côteau Landing Pier.....	.....	.....	.....	.....	.....	.....	194 195	3,295 41	250	39 44
7	Eboulements Pier...	.....	.....	.....	.....	297	470 80	194 285	2,392 50	.....	.....
8	House Harbour.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	L'Islet Pier.....	.....	.....	.....	.....	297	1,192 00	194 285	950 00	.....	.....
10	Mooring Piers, La- chine Rapids.....	.....	.....	.....	.....	.....	.....	278	860 95	.....	.....
11	Malbaie Pier.....	.....	.....	.....	.....	.....	.....	194 285	1,291 00	336	24 50
12	Piers below Quebec Generally.....	210	23 50	.....	.....	297	1,162 83	284 285	890 01	253	191 00
13	Quebec Harbour (Survey River St. Charles).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	Rimouski Pier.....	.....	.....	.....	.....	297	314 00	194 285	700 00	337	537 00
15	Rivière Blanche Pier	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	do du Loup do.	III. 43	50 00	243	11 90	297	90 00	285	320 00	337	66 66
17	do Ouelle or Pointe aux Orignaux.....	.....	.....	.....	.....	297	100 00	194 284	410 00	.....	.....
	Sault au Recollet Piers and Booms. (See Slides and Booms, folio —.)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals... ..	.....	77 50	.....	11 90	.....	3,959 63	.....	13,275 74	.....	3,276 28

BREAKWATERS for the undermentioned years—*Continued.*

BEC.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
140 142	4,783 63	191	4,721 03	.....	.....	.....	.....	.....	.....	14,283 21	1
.....	.....	.....	.....	.....	.....	268 269 283	3,084 34	.....	.....	3,084 34	2
.....	.....	192	122 19	241	7,085 13	283	18,413 71	.....	.....	25,621 03	3
.....	.....	203	15 00	.....	.....	.....	.....	265	3,938 17	4,372 17	4
.....	.....	191	6,000 00	240	2,065 35	268	1,976 40	.....	.....	10,041 75	5
140	6,242 03	196	274 00	341	1,603 00	.....	.....	.....	.....	11,453 88	6
222	337 00	.....	.....	.....	.....	269 283	10,007 27	.....	.....	13,207 57	7
.....	.....	196	2,291 60	.....	.....	.....	.....	.....	.....	2,291 60	8
.....	.....	203	159 00	256	1,289 85	.....	.....	265	2,821 19	6,412 04	9
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	860 95	10
222	200 00	203	465 00	.....	.....	269 283	14,021 04	265	141 80	16,143 34	11
220	210 10	203	427 30	256	50 00	283	885 17	.....	.....	3,829 91	12
.....	.....	.....	.....	.....	.....	276	6,458 02	.....	.....	6,458 02	13
.....	.....	203	1,035 00	.....	.....	.....	.....	.....	.....	2,616 00	14
.....	.....	.....	.....	.....	.....	269	873 65	255	1,080 16	1,953 81	15
222	200 00	203	214 00	.....	.....	.....	.....	265	909 30	1,861 86	16
.....	.....	203	2,899 00	.....	.....	.....	.....	255	1,213 78	4,622 78	17
.....	11,972 76	.....	18,623 12	.....	12,093 33	.....	55,719 60	.....	10,104 40	129,114 26	

YEARLY Expenditure on HARBOURS and

ONTA

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Bayfield, Lake Huron										
	Bay of Quinté—										
2	Belleveille										
3	Picton										
4	Chantry Island, Lake Huron							195	6,326 35	250	28,176 46
5	Cobourg, Lake Ontario										
6	Collingwood, Georgian Bay										
7	Colpoy's Range, Big Bay										
8	Goderich, Lake Huron										
9	Inverhuron, Lake Huron									249	69,344 5
10	Kincardine, Lake Huron	43	4,500 00					195	1,000 00	250	6,139 7
11	Kingston, Lake Ontario										
12	Meaford, Georgian Bay										
13	Oakville, Lake Ontario									253 337	140 7
14	Owen Sound, Georgian Bay										
15	Oshawa, Lake Ontario										
16	Port Albert, Lake Huron										
17	Port Burwell, Lake Erie										
18	Port Darlington, Lake Ontario										
19	Port Dover, Lake Erie	43	573 05	243	1,210 45			284	875 00		
20	Port Hope, Lake Ontario										
21	Port Stanley, Lake Erie										
	Carried forward...		5,073 05		1,210 45				8,201 35		103,801

(a) \$10,000.00 paid by Municipality of Stanley.

(b) 25,507.49 do Cobourg Harbour Trust Commissioners.

(c) 15,505.00 do Northern Railway.

BREAKWATERS for the undermentioned years—*Continued.*

RIO.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	.....	.....	.....	239	1,917 98	267	18,398 13	254 258	(a) 34,205 87	(a) 54,521 98	1
.....	.....	191	10,000 00	246	1,962 60	.....	.....	.....	.....	11,962 60	2
.....	.....	.....	.....	240	6,000 00	.....	.....	.....	.....	6,000 00	3
139	32,208 49	190	29,768 25	239	61,261 64	268	41,624 98	255	36,095 12	235,461 29	4
.....	.....	191	203 66	239	15,861 68	266	23,403 08	254	(b) 33,567 90	(b) 73,036 32	5
.....	.....	190	(c) 44,437 66	237	(d) 13,030 77	.....	.....	.....	.....	(c) and (d) 57,468 43	6
.....	.....	.....	.....	.....	.....	.....	.....	259	400 00	400 00	7
139	104,728 98	190	30,426 11	239	(e) 49,510 97	268	127,200 44	255	86,175 10	(e) 467,396 10	8
.....	.....	191	1,000 00	238	5,093 60	.....	.....	.....	.....	6,093 60	9
139 143	2,629 94	190 196	5,069 70	238	3,674 61	267 275	14,920 13	254	10,514 56	48,458 64	10
139	4,139 70	.....	.....	240	4,407 56	266	6,267 14	.....	.....	14,814 40	11
.....	.....	191	4,396 31	238	(f) 18,502 88	.....	.....	.....	.....	(f) 22,899 19	12
139	447 46	.....	.....	.....	.....	.....	.....	.....	.....	588 20	13
.....	.....	.....	.....	238	3,740 89	267 275	6,626 66	.....	.....	10,367 55	14
.....	.....	.....	.....	.....	.....	268	5,000 00	.....	.....	5,000 00	15
.....	.....	.....	.....	238	6,000 00	.....	.....	.....	.....	6,000 00	16
.....	.....	.....	.....	.....	.....	267 268	3,422 22	254	5,173 75	8,595 97	17
.....	.....	.....	.....	.....	.....	267	5,000 00	.....	.....	5,000 00	18
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,658 50	19
.....	.....	.....	.....	239	6,945 93	267	14,372 62	259	4,000 00	25,318 55	20
.....	.....	.....	.....	239	31 64	267	4,732 05	254	3,394 31	8,158 00	21
.....	144,164 57	.....	125,301 69	.....	197,942 75	.....	270,977 45	.....	213,526 61	1,070,199 32	

(d) \$12,763.26 paid by Northern Railway.

(e) 10,000.00 do Township of Goderich.

(f) 10,000.00 do Municipality of St. Vincent.

YEARLY Expenditure on HARBOURS and

ONTARIO—

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
	Brought forward.		5,073 05	.....	1,210 45	.....	.....	.....	8,201 35	.....	103,801 40
22	Presqu'Isle, Georgian Bay.....			244	300 00	298	75 00			281	68 43
23	Rondeau, Lake Erie									250	64,164 10
24	Saugeen (or Southampton)	43	3,500 00					199	2,500 00		
25	Shannonville, Lake Ontario										
26	Thunder Bay, Lake Superior										
27	Toronto, Lake Ontario										
	Totals		8,573 05	.....	1,510 45	.....	75 00	.....	10,701 35	.....	168,033 8

ABSTRACT STATEMENT of Expenditure

1	Nova Scotia			2,920 00						12,158 10
2	P. E. Island.....									
3	New Brunswick.....							4,000 00		2,012 10
4	Quebec		77 50	11 90		3,959 63		13,275 74		3,276 10
5	Ontario		8,573 05	1,510 45		75 00		10,701 35		168,033 8
	Totals		8,650 55	4,442 35		4,034 63		27,977 09		185,481 10

BREAKWATERS for the undermentioned years—*Concluded.*
Concluded.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	144,164 57	.....	125,301 69	.....	197,942 75	.....	270,977 45	.....	213,526 61	1,070,199 32	
139	6,859 30	190	9,282 00	240 248	10,365 39	.....	.....	.....	.....	26,950 12	22
139	60,163 50	190	28,053 06	239	30,965 08	.....	.....	.....	.....	183,345 80	23
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000 00	24
.....	.....	.....	.....	240	2,992 94	.....	.....	.....	.....	2,992 94	25
.....	.....	.....	.....	.....	.....	.....	.....	255	5,999 25	(a) 5,999 25	26
.....	.....	.....	.....	240	1,019 05	268	2,824 97	255	17,075 03	20,919 05	27
.....	211,187 37	.....	162,636 75	.....	243,285 21	.....	273,802 42	.....	236,600 89	1,316,406 48	

on HARBOURS and BREAKWATERS.

.....	95,749 21	.....	124,852 06	.....	121,121 09	.....	151,822 22	.....	53,250 03	561,873 00	1
.....	.....	.....	.....	.....	5,829 20	.....	25,061 00	.....	25,121 33	56,011 53	2
.....	24,000 65	.....	40,556 75	.....	58,582 47	.....	92,609 25	.....	76,756 05	298,517 76	3
.....	11,972 76	.....	18,623 12	.....	12,093 33	.....	55,719 60	.....	10,104 40	129,114 26	4
.....	211,187 37	.....	162,636 75	.....	243,285 21	.....	273,802 42	.....	236,600 89	1,316,406 48	5
.....	342,909 99	.....	346,668 68	.....	440,911 30	.....	599,014 49	.....	401,832 70	2,361,923 03	

(a) Further expenditure included in Pacific Railway.

YEARLY Expenditure on IMPROVEMENTS OF

NOV

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
			\$ cts.		\$ cts.		\$ cts.		\$ cts.		\$ cts.
1	East River, Pictou.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	*Meteghan River.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	*Salmon do.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Sissiboo do.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NEW

1	Miramichi River.....	.....	.....	.....	.....	.....	.....	.....	.....	II.	.....
2	Petitcodiac do.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	St. John do.....	.....	.....	.....	.....	.....	.....	.....	.....	252	1,368
	Totals.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,368

QU

1	Cap de Chatte River.....	.....	.....	.....	.....	.....	.....	.....	.....	II.	.....
										250	792
2	Chateauguay do.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	Gatineau do.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Ottawa River (proportion of expenditure).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	Richelieu River.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	Rivière à la Graise, Rigaud.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	Rivière du Loup (<i>en haut</i>).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	St. Lawrence—Removal of Rock Cap à la Roche.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Dredging at Contrecoeur.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	Removal of Chains and Anchors.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	St. Francis River.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	792

* These should appear in "Harbours," folio 34.

RIVERS for the undermentioned years.

SCOTIA.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	.....	.....	.....	.....	.....	251	342 73	.....	.....	342 73	1
141	4,500 00	.....	.....	.....	.....	.....	.....	.....	.....	4,500 00	2
.....	.....	193	2,656 03	.....	.....	.....	.....	.....	.....	2,656 03	3
.....	.....	.....	.....	243	2,500 00	.....	.....	.....	.....	2,500 00	4
.....	4,500 00	.....	2,656 03	.....	2,500 00	.....	342 73	.....	.....	9,998 76	

BRUNSWICK.

.....	.....	.....	.....	.....	.....	251	2,955 48	.....	.....	2,955 48	1
142	4,000 00	195	7,242 00	242	1,194 00	.....	.....	.....	.....	12,436 00	2
144	2,270 43	171	7,480 35	220	10,478 28	251	3,332 80	240	55 00	21,985 46	3
.....	6,270 43	.....	14,722 35	.....	11,672 28	.....	6,288 28	.....	55 00	40,376 94	

BEC.

II.		II.		II.		II.		II.			
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	792 20	1
.....	.....	.....	.....	.....	.....	274	1,680 80	258	1,602 99	3,283 79	2
.....	.....	196	15,916 32	245	22,221 50	.....	.....	.....	.....	38,137 82	3
.....	.....	.....	.....	.....	.....	251	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	275	2,559 37	.....	.....	2,559 37	4
144	1,620 00	170	3,332 27	220	21,119 96	251	3,988 21	240	4,125 87	34,186 31	5
.....	.....	196	527 62	.....	.....	.....	.....	.....	.....	527 62	6
139	1,000 00	191	1,000 00	.....	.....	.....	.....	.....	.....	2,000 00	7
144	12,000 00	170	5,000 00	.....	.....	.....	.....	.....	.....	17,000 00	8
.....	.....	196	13,752 37	.....	.....	.....	.....	.....	.....	13,752 37	9
.....	.....	171	31 20	220	25,000 00	251	12,008 32	240	12,000 00	49,039 52	10
.....	.....	.....	.....	246	5,365 00	274	8,853 51	.....	.....	14,218 51	11
.....	14,620 00	.....	39,559 78	.....	73,706 46	.....	29,090 21	.....	17,728 86	175,497 51	

YEARLY Expenditure on IMPROVEMENTS of
ONTA

Number.	Name of Work.	Year ended							
		1868.		1869.		1870.		1871.	
		\$ cts.		\$ cts.		\$ cts.		I. \$ cts. II. \$ cts.	
1	Detroit River .....	.....	.....	.....	.....	.....	.....	.....	.....
2	Napanee do .....	.....	.....	.....	.....	.....	.....	.....	.....
3	Neebish Rapids, St. Mary's River.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Ottawa River.....	.....	.....	.....	.....	.....	198 149 15	.....	.....
5	Salmon do	251 825 1
6	Sydenham do
7	Thames do	198 (a) 4,834,04
	Totals.....	4,983 19	825

MA

1	Red River.....
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BRITIS

1	Fraser River.....
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ABSTRACT STATEMENT of Expenditure of

1	Nova Scotia.....
2	New Brunswick.....	1,368
3	Quebec.....	792
4	Ontario.....	.....	.....	.....	.....	.....	4,983 19	.....	825
5	Manitoba.....	.....	.....	.....	.....	.....	.....	.....	.....
6	British Columbia.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	.....	.....	4,983 19	.....	2,980

(a) Including \$2,000.00 paid by the Counties of Kent and Lambton.

RIVERS for the undermentioned years—*Concluded.*

RIO.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	220	200 00	251	7,060 32	.....	.....	7,260 32	1
.....	(b)	.....	.....	(b)	
.....	191	4,999 73	.....	.....	251	12,527 39	.....	.....	17,527 12	2
.....	240	9,601 92	9,601 92	3
.....	245	2,660 00	251	2,559 38	.....	.....	5,368 53	4
.....	825 10	5
.....	247	8,133 02	275	132 14	.....	.....	8,265 16	6
144	(a)	
220	7,260 11	171	1,558 22	.....	.....	275	1,563 75	.....	.....	15,156 12	7
.....	7,260 11	6,557 95	10,993 02	23,782 98	9,601 92	64,004 27	

TOBA.

144	1,350 00	171	3,684 90	220	200 00	5,234 90	1
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COLUMBIA.

144	3,299 73	171	839 25	220	5,739 08	251	1,621 63	11,499 69	1
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IMPROVEMENTS of RIVERS.

.....	4,500 00	2,656 03	2,500 00	342 73	9,998 76	1
.....	6,270 43	14,722 35	11,672 28	6,288 28	55 00	40,376 94	2
.....	14,620 00	.....	39,559 78	.....	73,706 46	.....	29,090 21	.....	17,728 86	175,497 51	3
.....	7,260 11	.....	6,557 95	.....	10,993 02	.....	23,782 98	.....	9,601 92	64,004 27	4
.....	1,350 00	.....	3,684 90	.....	200 00	.....	.....	.....	.....	5,234 90	5
.....	3,299 73	.....	839 25	.....	5,739 08	.....	1,621 63	.....	.....	11,499 69	6
.....	37,300 27	.....	68,020 26	.....	104,810 84	.....	61,125 83	.....	27,385 78	306,612 07	

(b) Including \$5,000 paid by the Municipalities of Napanee, Lennox and Addington.

YEARLY Expenditure on DREDGES

CONSTRUCTED

NOVA SCOTIA AND

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
			\$ cts.		\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	"New Dominion"					181	8,873 67	195 196	11,846 43		
2	"Canada"							196	13,237 33	251	13,778 6
3	"St. Lawrence"										
4	"Cape Breton"										
5	Tugs.....										
	Totals						8,873 67		25,083 76		13,778 6

PRINCE EDWARD

1	"Prince Edward"										
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ONTARIO

1	"Challenge"										
2	Tug "C. W. Jones" or "Trudeau"										
	Totals										

BRITISH COLUMBIA

1	"Douglas"										
2	Tug "George"										
	Totals										

ABSTRACT STATEMENT of Expenditure

1	Nova Scotia						4,436 83		12,541 88		6,889
2	New Brunswick.....						4,436 84		12,541 88		6,889
3	P. E. Island										
4	Ontario										
5	British Columbia										
	Totals						8,873 67		25,083 76		13,778

for the undermentioned years.

TION.

NEW BRUNSWICK.

30th June.										Total for Ten Years, to 30th June, 1877.	Number
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
143	3,995 92	.....	.....	.....	.....	.....	.....	258	2,960 49	27,676 51	1
143	13,717 28	.....	.....	.....	.....	274	384 46	258	182 50	41,300 19	2
...	.....	197	31,795 54	245	64,672 02	274	18,443 67	.....	.....	114,911 23	3
.....	.....	197	11,094 00	245	6,270 38	274	520 00	.....	.....	17,884 38	4
.....	.....	.....	.....	.....	.....	.....	350 50	.....	.....	350 50	5
....	17,713 20	42,889 54	70,942 40	19,698 63	3,142 99	202,122 81	

WARD ISLAND.

.....	245	23,582 07	23,582 07	1
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IO.

43	19,350 00	197	10,584 32	245	1,277 00	31,211 32	1
.....	274	6,847 05	6,847 05	2
.....	19,350 00	10,584 32	1,277 00	6,847 05	38,058 37	

OLUMBIA.

.....	.....	.....	.....	245	1,447 96	.....	.....	.....	.....	1,447 96	1
.....	.....	.....	.....	245	6,250 00	.....	.....	.....	.....	6,250 00	2
.....	.....	.....	.....	.....	7,697 96	.....	.....	.....	.....	7,697 96	

iture on DREDGES—Construction.

.....	8,856 60	.....	21,444 77	.....	35,471 20	.....	9,849 32	.....	1,571 49	101,061 41	1
.....	8,856 60	.....	21,444 77	.....	35,471 20	.....	9,849 31	.....	1,571 50	101,061 41	2
.....	.....	.....	.....	.....	23,582 07	.....	.....	.....	.....	23,582 07	3
.....	19,350 00	.....	10,584 32	.....	1,277 00	.....	6,847 05	.....	.....	38,058 37	4
.....	.....	.....	.....	.....	7,697 96	.....	.....	.....	.....	7,697 96	5
.....	37,063 20	.....	53,473 86	.....	103,499 43	.....	26,545 68	.....	3,142 99	271,461 21	

EXPENDITURE on DREDGING

Number.	Name of Work.	Year ended							
		1868.		1869.		1870.		1871.	
		\$	cts.	\$	cts.	\$	cts.	I.	\$
1	Nova Scotia								
2	P. E. Island.								
3	New Brunswick.							195 199	1,788 98
4	Quebec	I. 117 III. 43	3,975 10						251 7,356 40
5	Ontario	I. 117 III. 42	2,852 62						
6	British Columbia ...								603 67
	Totals		6,827 72						1,788,98 7,960 07

YEARLY Expenditure on
CONSTRUCTION
QUEBEC

1	St. Maurice District Works	I.		I.		I.		198 199	140 76	II. 251	37,691 90
2	Ottawa River (proportion of expenditure)	117	2,000 00	154	1,621 80						
3	Gatineau River	III.									
4	Coulonge River.....	42	18 00			185	300 00				
5	Black River							198	2,500 00		
6	Rivière du Moine ...									251	18,410 44
7	Rivière des Prairies (removal of obstruction, &c.)							198	1,121 16	252	1,085 25
8	do Sault au Recollet Pier.							199	19 88		6,263 18
	Totals		2,018 00		1,621 80		300 00		3,781 80		63,450 80

ONTARIO

1	Ottawa River (proportion of exp.) ..	117	2,000 00	154	1,621 80						
2	Madawaska River ..									251	1,350 00
3	Petewawa do ...	I. 116 III. 42									
4	Newcastle Works ...		380 85								
	Totals		2,380 85		1,621 80						1,350 00

for the undermentioned years.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
142	9,079 72	196	6,288 03	246	9,044 38	275	21,985 12	258	34,846 74	81,243 99	1
.....	.....	.....	.....	246	8,290 85	275	10,891 80	258	12,758 27	31,940 92	2
142	12,812 43	196	13,932 96	246	15,525 13	275	16,911 30	258	23,160 90	91,488 10	3
142 143	4,123 49	196	7,715 46	.....	See "Rivers"	275	170 93	258	585 90	16,570 88	4
143	200 00	196	8,453 89	245 246	2,213 22	275	1,151 08	258	7,388 07	22,258 88	5
143	12,964 88	197	8,036 23	247	16,868 17	276	17,731 52	258	566 62	56,771 09	6
.....	39,180 52	.....	44,426 57	.....	51,941 75	.....	68,841 75	.....	79,306 50	300,273 86	

SLIDES and BOOMS.

ION.

EC.

II.		II.		II.		II.		II.			
143	33,597 30	189	31,500 00	248	17,497 18	274	25,436 20	.....	.....	145,863 34	1
143	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
156	11,392 11	189	8,349 18	.....	.....	.....	.....	258	60 00	23,423 09	2
.....	.....	189	28,716 94	.....	.....	.....	.....	.....	.....	28,716 94	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	318 00	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500 00	5
156	1,068 10	.....	.....	.....	.....	.....	.....	.....	.....	19,478 54	6
.....
156	333 35	189	497 56	.....	.....	.....	.....	.....	.....	3,037 35	7
.....	1,263 68	.....	.....	247	2,917 34	273	2 40	.....	.....	10,466 48	8
.....	47,654 54	.....	69,063 68	.....	20,414 52	.....	25,438 60	.....	60 00	233,803 74	

10.

43	11,392 11	189	8,349 18	.....	.....	.....	.....	258	60 00	23,423 09	1
56	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,350 00	2
.....	.....	189	7,713 00	.....	.....	.....	.....	.....	.....	7,713 00	3
.....
.....	.....	189	4,090 00	247	572 35	.....	.....	.....	.....	5,043 20	4
.....	11,392 11	.....	20,152 18	.....	572 35	.....	.....	.....	60 00	37,529 29	

ABSTRACT STATEMENT of Expenditure on SLIDES and

Number.	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Quebec	2,018 00	1,621 80	300 00	3,781 80	63,450 80
2	Ontario	2,380 85	1,621 80	.....	.....	1,350 00
	Totals.	4,398 85	3,243 60	300 00	3,781 80	64,800 80

YEARLY Expenditure on
STAFF and
QUE

		I. 208 III.		I.		I.		I.		II.	
1	Saguenay District Works—Staff	66	838 16	241	712 05	296	690 80	283	752 39	335	691 05
2	do Repairs...	66	3,297 01	241	165 35	296	119 20	283	83 90	336	818 23
3	do Collection .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals...	.....	4,135 17	.....	877 40	.....	810 00	.....	836 29	.....	1,509 33
4	St. Maurice District Works—Staff	66	9,914 15	201	9,668 61	295	9,166 67	283	11,489 30	335	12,311 53
5	do Repairs...	208	6,351 81	201	3,258 51	296	7,258 72	283	5,183 99	336	5,522 19
6	do Collection .....	.....	.....	.....	.....	296	577 40	283	382 51	.....	398 32
	Totals...	.....	16,265 96	.....	12,927 15	.....	17,002 79	.....	17,055 80	.....	18,233 05
7	Ottawa District Works—Staff (proportion of expenditure)	65	6,995 82	240	7,209 85	294	7,965 60	282	8,592 50	335	7,601 97
	Ottawa District Works—Repairs	207	.....	240	.....	294	.....	.....	.....	.....	.....
8	Ottawa River...	65	2,812 64	241	4,212 19	295	4,900 26	283	2,641 33	335	6,459 34
9	Gatineau River	207	496 45	240	959 81	295	177 45	283	384 68	335	503 47
10	Coulonge River	65	1,302 61	241	915 19	295	238 75	283	1,543 80	335	2,408 50
	Carried forward..	.....	11,607 52	.....	13,297 04	.....	13,282 06	.....	13,162 31	.....	16,973 27

BOOMS—Construction, for the undermentioned years.

30th June.							Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.	1877.	
\$ cts.		\$ cts.		\$ cts.		\$ cts.	\$ cts.	
..... 47,654 54	.....	69,063 68	.....	20,414 52	.....	25,438 60	60 00	233,803 74 1
..... 11,392 11	.....	20,152 18	.....	572 35	.....	.....	60 00	37,529 29 2
..... 59,046 65	.....	89,215 86	.....	20,988 87	.....	25,438 60	120 00	271,333 03

SLIDES and BOOMS.

REPAIRS, &c.

BEC.

II.		II.		II.		II.		II.			
221	634 05	204	684 03	258	932 80	284	716 05	266	741 05	7,442 43	1
221	541 50	204	3,455 44	258	1,372 81	284	4,025 20	266	518 08	14,396 77	2
.....	.....	.....	.....	.....	.....	284	400 23	.....	.....	400 23	3
.....	1,225 55	.....	4,139 47	.....	2,305 61	.....	5,141 48	.....	1,259 13	22,239 43	
221	16,356 60	204	17,767 31	257	17,851 96	284	18,251 84	265	13,675 26	136,453 26	4
221	7,092 48	204	9,560 48	257	9,036 51	284	4,490 87	265	5,892 27	63,647 78	5
222	428 00	204	443 60	258	571 60	284	568 00	267	618 00	3,987 44	6
.....	23,877 03	.....	27,771 39	.....	27,460 07	.....	23,310 71	.....	20,185 53	204,088 48	
221	7,147 79	203	10,893 49	256	10,913 35	283	10,052 40	265	10,584 18	87,956 95	7
221	3,607 81	203	4,088 95	256	16,532 43	283	3,044 88	265	5,233 96	53,533 79	8
335	836 72	204	703 90	257	16,383 69	283	1,108 84	265	407 21	21,962 17	9
.....	430 74	.....	778 79	257	2,369 89	283	2,455 81	265	1,406 01	13,850 15	10
.....	12,023 06	.....	16,465 13	.....	46,199 36	.....	16,661 93	.....	17,631 36	177,303 06	

EXPENDITURE on SLIDES AND BOOMS
STAFF AND REPAIRS
QUEBEC—

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
			\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
	Brought forward.....		11,607 52	.....	13,297 04	.....	13,282 06	.....	13,162 31	.....	16,973 20
	Ottawa Dist. Works, Repairs— <i>Con.</i>	I. 207 III.									
11	Black River.....	65	315 90	241	362 00	294	639 59	283	10,894 31	335	.....
12	Dumoine River.....		.....	.....	.....	295	1,935 87	.....	.....	335	3,624 00
13	Rivière des Prairies—Sault au Recollet Pier.....		.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals		11,923 42	.....	13,659 04	.....	15,857 52	.....	24,056 62	.....	20,597 30
	Grand Totals		32,324 55	.....	27,463 59	.....	33,670 31	.....	41,948 71	.....	40,338 70

ONTA

1	Ottawa District Works, Staff (proportion of expenditure)	I. 209 III. 65	6,995 83	249	7,209 85	294	7,965 60	282	8,592 50	335	7,601 90
2	Ottawa River Works (proportion of expenditure).....	I. 207 III. 65	2,812 64	240	4,212 19	295	4,900 26	283	2,541 32	335	6,459 30
3	Madawaska River...	207 III. 65	3,055 01	240	6,084 07	295	10,635 87	283	9,660 07	335	11,136 80
4	Petewawa do ...	III. 66	115 10	240	389 93	295	475 49	283	1,194 80	335	709 80
	Totals		12,978 58	.....	17,896 04	.....	23,977 22	.....	21,988 69	.....	25,907 80
5	Newcastle Staff.....	I. 209 III. 67	844 61	242	486 00	297	507 28	284	994 50	336	621 00
6	do Repairs.....	I. 210 III. 67	4,377 61	243	3,249 49	297	2,935 49	284	6,987 21	336	7,664 00
7	do Contingencies .....		.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals		5,222 22	.....	3,735 49	.....	3,442 77	.....	7,981 71	.....	8,285 70
	Grand Totals...		18,200 80	.....	21,631 53	.....	27,419 99	.....	29,970 40	.....	34,193 70

for the undermentioned years—*Continued.*&c.—*Continued.**Concluded*

30th June.										Total for Ten Years, to 30th June, 1877.	Number
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	12,023 06	.....	16,465 13	.....	46,199 36	.....	16,661 93	.....	17,631 36	177,303 06	
221	2,926 05	204	700 00	257	162 78	283	528 17	265	1,740 79	18,269 59	11
221	1,086 46	204	937 97	257	2,154 93	.....	.....	265	1,252 84	10,992 14	12
204	244 77	203	1,646 36	.....	.....	.....	.....	.....	.....	1,891 13	13
.....	16,280 34	.....	19,749 46	.....	48,517 07	... ..	17,190 10	.....	20,624 99	208,455 92	14
.....	41,382 92	.....	51,660 32	.....	78,282 75	.....	45,642 29	.....	42,069 65	434,783 83	

RIO.

II.		II.		II.		II.		II.		
221	7,147 79	203	10,693 49	256	10,913 35	283	10,052 39	265	10,584 18	87,956 95
221	3,607 81	203	4,088 95	256	16,532 44	283	3,044 88	265	5,233 96	53,433 80
221	1,423 58	204	3,413 42	257	2,588 59	283	2,932 51	265	2,882 06	53,812 02
221	3,782 45	204	12,848 00	257	3,336 01	.....	.....	265	2,368 82	25,220 42
.....	15,961 63	.....	31,243 86	.....	33,370 39	.....	16,029 78	.....	21,069 02	220,423 19
221	690 18	204	1,976 28	258	2,250 52	284	2,300 82	266	2,325 03	12,996 87
221	5,393 23	204	5,969 47	258	2,716 26	284	2,302 75	266	3,540 89	45,136 48
.....	.....	.....	.....	.....	.....	284	60 00	266	7 20	67 20
.....	6,083 41	.....	7,945 75	.....	4,966 78	.....	4,663 57	.....	5,873 12	58,200 55
.....	22,045 04	.....	39,189 61	.....	38,337 17	.....	20,693 35	.....	26,942 14	278,623 74

ABSTRACT Statement of Expenditure on SLIDES and BOOMS—

Number	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Quebec	32,324 55	27,463 59	33,670 31	41,948 71	40,338 7
2	Ontario	18,200 80	21,631 53	27,419 99	29,979 40	34,193 7
	Total	50,525 35	49,095 12	61,090 30	71,919 11	74,532 4

YEARLY Expenditure on
NOV.

Mail road between Liverpool and Annapolis.....	I.	I.						
.....	161	670 91	185	839 01	.....	.....	.....	.....

NEW

1 Apohaqui Bridge...	I.							
.....	126	2,368 34	.....	.....	.....	.....	.....	.....

QU

1 Gatineau Bridge....	III.	I.	I.		I.	II.		
2 Gulf Road.....	46	272 10	.....	.....	.....	204	8,952 66	252 1,047
	I.							
	126							
3 Métapédia Road....	III.					199		252
.....	48	6,511 31	161	1,568 30	185	1,716 25	204	3,183 84
	III.							253
4 Petite Nation Bridge	48	300 66	.....	.....	295	385 20	.....	.....
5 Ottawa Union Suspension Bridge (proportion of Expenditure).....	I.							335
.....	209	545 99	242	360 97	.....	.....	283	50 00
6 Portage du Fort Bridge .....		.....	.....	.....	.....	.....	.....	337
		.....	.....	.....	.....	.....	.....	252
7 Port Louis and Huntingdon Road....	I.							337
.....	126	8,691 08	158	2,726 39	185	25 82	204	45 00
	126							337
8 Restigouche Road..	III.							
.....	47	8,335 82	.....	.....	.....	.....	.....	.....
	I.							
	126							
9 Temiscouata Road .	III.							
.....	48	652 87	161	502 00	.....	.....	204	3,656 32
	III.						356	252
10 Generally.....	48	3,127 00	.....	.....	.....	.....	.....	2,211
Totals.....		28,436 83	.....	5,157 66	.....	2,127 27	.....	16,287 82
								8,707

(a) Including \$1,500 paid by Municipality. (b) \$4,000 granted by the Ontario Government.

Staff and Repairs, &c., for the undermentioned years.

30th June.										Total for Ten Years, to 30th June, 1877.		Number.
1873.		1874.		1875.		1876.		1877.				
	\$ cts.		\$ cts.		\$ cts.		\$ cts.		\$ cts.	\$ cts.		
.....	41,382 92	.....	51,660 32	.....	78,282 75	.....	45,642 29	.....	42,069 65	434,783 83	1
.....	22,045 04	.....	39,189 61	.....	38,337 17	.....	20,693 35	.....	26,942 14	278,623 74	2
.....	63,427 96	.....	90,849 93	.....	116,619 92	.....	66,335 64	.....	69,011 79	713,407 57	

ROADS and BRIDGES.

SCOTIA.

[illegible]

BRUNSWICK.

[illegible]

BEC.

[illegible]

EXPENDITURE on ROADS and BRIDGES

ONT.

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		III.	cts.	I.	\$ cts	I.	\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Dunnville Bridge...	67	2,573 65	.....	.....	.....	.....	.....	.....	.....	.....
2	Fort William Road.	121	1,000 00	155	14,900 00	312	98,361 15	299	84,966 92	357	9,967
3	Ottawa Union Suspension Bridge (proportion of Expenditure).....	209	545 99	242	360 97	298	25 00	283	50 00	335	522
4	Ottawa, Chaudière Bridge.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	Red River & Transport Service —Construction— (proportion of Expenditure).....	.....	.....	.....	.....	.....	.....	.....	.....	357	187,675
6	Red River & Transport Service —Staff and Repairs—(proportion of Expenditure).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	Windsor and Scugog Roads.....	III. 67	581 65	.....	.....	.....	.....	.....	.....	.....	.....
8	York Roads.....	.....	474 05	.....	.....	II. 82	1,170 91	.....	.....	.....	.....
	Totals.....	.....	5,175 34	.....	15,260 97	.....	99,557 06	.....	85,016 92	.....	198,165

MA

1	Boats for Transport Service.....	.....	.....	I.	.....	II. 314	27,119 99	I. 301	45,073 02	II.	.....
2	Fort Garry Road.....	.....	.....	155	4,213 13	312	25,445 61	299	23,875 59	357	100,109
3	do Bridge (over Red River).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Red River Route and Transport Service Construction.....	.....	.....	.....	.....	.....	.....	.....	.....	357	26,810
5	do Staff and Repairs.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Totals.....	.....	.....	.....	4,213 13	.....	52,565 60	.....	68,948 61	.....	126,920

ABSTRACT STATEMENT of Expenditure

1	Nova Scotia.....	.....	.....	.....	670 91	.....	839 01	.....	.....	.....	.....
2	New Brunswick.....	.....	2,368 34	.....	.....	.....	.....	.....	.....	.....	.....
3	Quebec.....	.....	28,436 83	.....	5,157 66	.....	2,127 27	.....	16,287 82	.....	8,707
4	Ontario.....	.....	5,175 34	.....	15,260 97	.....	99,557 06	.....	85,016 92	.....	198,165
5	Manitoba.....	.....	.....	.....	4,213 13	.....	52,565 60	.....	68,948 61	.....	126,920
	Totals.....	.....	35,980 51	.....	25,302 67	.....	155,088 94	.....	170,253 35	.....	333,793

EXPENDITURE on SURVEY

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I.	\$ cts	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.	II.	\$ c
1	Nova Scotia.....	121	339 29	157	46 35	179	123 45	203	566 65	260	1,028
2	P. E. Island.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	New Brunswick....	121	339 29	157	392 84	179	123 45	203	566 64	260	733
4	Quebec.....	121	2,738 44	157	4,882 91	179	6,415 23	203	7,791 01	260	2,239
5	Ontario.....	121 III. 45	2,888 64	157	3,045 42	179	1,190 90	203	7,991 55	260	8,320
6	N.-W. Territories...	.....	.....	.....	.....	.....	.....	.....	.....	371	116
7	British Columbia...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....		.....	6,305 66	.....	8,567 52	.....	7,853 63	.....	16,918 85	.....	12,437

ARBITRATIONS

1	Arbitrations.....	I. 122 III. 46	2,416 66	I. 158	1,000 00	I. 180	7,489 78	I. 204	5,563 80	II. 261	4,329
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YEARLY Expenditure

CONSTRUCTION

1	Manitoba.....
2	British Columbia....
Totals.....	

WORKING

1	British Columbia....
2	Prince Ed. Island...
Totals.....	

YEARLY Expenditure

1	British Columbia....
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for the undermentioned years.

30th June.										Total for Ten Years, to 30th June, 1877.	Number.
1873.		1874.		1875.		1876.		1877.			
	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
50	909 08	175	6,876 68	248	7,078 91	277	6,878 52	259	3,938 03	27,785 28	1
					140 00		58 33	259	1,038 87	1,237 20	2
50	4,903 37	175	6,795 40	248	7,078 90	277	6,878 52	259	5,675 90	33,487 56	3
50	11,032 22	175	8,720 64	248	1,675 44	277	708 56	259	1,114 88	47,318 88	4
50	11,411 99	175	17,719 62	248	19,032 76	277	28,396 17	259	25,638 09	125,638 31	5
	681 99									681 99	6
50	253 50									369 50	7
..	29,192 15		40,112 34		35,006 01		42,920 10		37,405 77	236,518 72	

IONS.

1	6,926 72	II. 176	8,922 82	II. 249	5,222 95	II. 277	5,169 28	II. 259	6,234 20	53,276 11	1
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TELEGRAPH LINES

ION.

5	72 00	II. 249	9,044 00	72 00	1
.....	9,044 00	2
.....	72 00	9,044 00	9,116 00	

EXPENSES.

5	51,990 77	II. 205	29,021 19	II. 259	37,774 21	II. 273	41,329 04	II. 267	31,108 74	191,223 95	1
.....	.....	205	973 33	259	1,946 66	273	1,946 66	267	1,946 66	(a) 6,813 31	2
.....	51,990 77	29,994 52	39,720 87	43,275 70	33,055 40	198,037 26	

AGENT and CONTINGENCIES.

.....	II. 285	2,506 83	II. 267	2,548 52	5,055 35	1
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(a) Government Subsidy.

EXPENDITURE on LIGHT
CONSTRUC
NOVA

Number.	Name of Work.	Year ended									
		1868.		1869.		1870.		1871.		1872.	
		I. 119 120	\$ cts.	I.	\$ cts.		\$ cts.	I.	\$ cts.	II.	\$ cts.
1	Anet Island.	120	218 03	.....	.....	.....	.....	.....	.....	.....	.....
2	Arichat. ....	.....	.....	155	6,905 80	.....	.....	.....	.....	.....	.....
3	Barrington. ....	.....	292 00	.....	.....	.....	.....	.....	.....	.....	.....
4	Battery Point (or Lunenburg). ....	.....	28 81	.....	.....	.....	.....	.....	.....	.....	.....
5	Bird Island. ....	.....	121 67	.....	.....	.....	.....	.....	.....	.....	.....
6	Black Rock Point. ....	.....	2,768 00	.....	.....	.....	.....	.....	.....	.....	.....
7	Boar's Head. ....	.....	138 30	.....	.....	.....	.....	.....	.....	.....	.....
8	Cape St. George. ....	.....	39 13	.....	.....	.....	.....	.....	.....	.....	.....
9	Cape St. Mary. ....	.....	4,667 57	.....	.....	.....	.....	.....	.....	.....	.....
10	Cariboo Island. ....	.....	3,221 02	.....	.....	.....	.....	.....	.....	.....	.....
11	Devil's Island. ....	.....	310 14	.....	.....	.....	.....	.....	.....	.....	.....
12	Egg Island. ....	.....	324 60	.....	.....	.....	.....	.....	.....	.....	.....
13	Little Hope Island. ....	.....	.....	.....	.....	.....	.....	204	34 74	256	41 9
14	Meagher's Point. ....	.....	486 43	.....	.....	.....	.....	.....	.....	.....	.....
15	Moser's Island. ....	.....	3,389 84	.....	.....	.....	.....	.....	.....	.....	.....
16	Parrsboro'. ....	.....	1,254 45	.....	.....	.....	.....	.....	.....	.....	.....
17	Peggy's Point. ....	.....	3,010 84	.....	.....	.....	.....	.....	.....	.....	.....
18	Pomkett Island. ....	.....	1,590 43	.....	.....	.....	.....	.....	.....	.....	.....
19	Port Hood Wharf. ....	.....	47 56	.....	.....	.....	.....	.....	.....	.....	.....
20	Port Medway. ....	.....	68 13	.....	.....	.....	.....	.....	.....	.....	.....
21	Pubnico. ....	.....	24 51	.....	.....	.....	.....	.....	.....	.....	.....
22	Ram Rock Beacon. ....	.....	39 96	.....	.....	.....	.....	.....	.....	.....	.....
	Totals. ....	.....	22,041 42	.....	6,905 80	.....	.....	.....	34 74	.....	41 9

NEW

				I.		I.		I.		II.	
1	Cape Jourimain. ....	.....	.....	.....	.....	209	3,383 98	179	670 36	253	6 0
2	Maisonette. ....	.....	.....	.....	.....	209	216 65	179	.....	.....	.....
3	Portage Island and Preston's Beach. ....	.....	.....	154	850 00	.....	.....	.....	.....	.....	.....
4	Shediac Beacon Light. ....	.....	.....	154	400 00	.....	.....	.....	.....	.....	.....
5	St. John Beacon. ....	.....	.....	154	272 78	.....	.....	.....	.....	.....	.....
6	do River Beacon Light. ....	.....	.....	154	2,751 40	.....	.....	.....	.....	.....	.....
	Totals. ....	.....	.....	.....	4,274 18	.....	3,600 63	.....	670 36	.....	6 0

OUSES for the undermentioned years.

ION.

OTIA.

th June.						Total for Ten Years, to 30th June, 1877.	Number.
1873	1874.	1875.	1876.	1877.			
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
						218 03	1
						6,905 80	2
						292 00	3
						28 81	4
						121 67	5
						2,768 00	6
						138 30	7
						39 13	8
						4,667 57	9
						3,221 02	10
						310 14	11
						324 60	12
14 12,218 44						12,295 09	13
						486 43	14
						3,389 84	15
						1,254 45	16
						3,010 84	17
						1,590 43	18
						47 56	19
						68 13	20
						24 51	21
						39 96	22
12,218 44						41,242 31	

UNSWICK.

								4,060 34	1
								216 65	2
								850 00	3
								400 00	4
								272 78	5
								2,751 40	6
								8,551 17	7

EXPENDITURE on LIGHTHOUSES
CONSTRUCTED
QUEBEC

Number.	Name of Work.	Year ended							
		1868.		1869.		1870.		1871.	
		III.	\$ cts.	I.	\$ cts.	I.	\$ cts.	I.	\$ cts.
1	Bicquet Island	43	48 00	.....	.....	.....	.....	.....	.....
2	Cap Rosier	43	80 00	.....	.....	.....	.....	.....	.....
3	Paspébiac .....	.....	.....	.....	.....	193	216 81	.....	.....
		I.							
		118							
		III.							
4	Point St. Laurent...	43	7,160 86	154	7,492 59	193	1,326 25	.....	.....
	Totals .....	.....	7,288 86	.....	7,492 19	.....	1,543 06	.....	.....

ONTARIO

1	Byng Inlet .....	.....	.....	.....	.....	1.	.....	I.	.....
		.....	.....	.....	.....	193	357 69	.....	.....
		I.							
		118							
		III.							
2	Clapperton Island .	43	605 20	.....	.....	.....	.....	.....	.....
3	False Duck do .....	.....	.....	.....	.....	.....	.....	.....	(a) 800 00
		III.							
4	Gibraltar Point.....	43	55 00	.....	.....	.....	.....	.....	.....
5	Gull Island.....	43	192 80	.....	.....	.....	.....	.....	.....
6	Killarney (Leading Light)	43	660 20	.....	.....	.....	.....	.....	.....
7	Little Current.....	43	660 20	.....	.....	.....	.....	.....	.....
8	Michael's Point.....	.....	.....	.....	.....	193	259 94	199	195 00
9	Point Pleasant.....	43	357 72	.....	.....	.....	.....	.....	.....
10	St. Ignace.....	43	605 03	.....	.....	.....	.....	.....	.....
11	Sulphur Island.....	193	2,359 20
	Totals.....	3,136 15	2,976 83	195 00
		800 00

BRITISH

1	Cape Beale.....
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(a) Purchase price of Island.

for the undermentioned years—Continued.

ION—Continued.

EC.

30th June.						Total for Ten Years, to 30th June, 1877.	Number.
1873.	1874.	1875.	1876.	1877.			
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
.....	48 00	1
.....	80 00	2
.....	216 81	3
.....	15,979 70	4
.....	16,324 51	

D).

.....	.....	.....	.....	.....	.....	.....	.....	357 69	1
.....	.....	.....	.....	.....	.....	.....	.....	605 20	2
.....	.....	.....	.....	.....	.....	.....	.....	800 00	3
.....	.....	.....	.....	.....	.....	.....	.....	55 00	4
.....	.....	.....	.....	.....	.....	.....	.....	192 80	5
.....	.....	.....	.....	.....	.....	.....	.....	660 20	6
.....	660 20	7
.....	454 94	8
.....	357 72	9
.....	605 03	10
.....	2,359 20	11
.....	7,107 98	

COLUMBIA.

.....	II. 309	2,362 54	2,362 54	1
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ABSTRACT STATEMENT of Expenditure on LIGHT

Number.	Name of Work.	Year ended				
		1868.	1869.	1870.	1871.	1872.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Nova Scotia.....	22,041 42	6,905 80	.....	34 74	41 9
2	New Brunswick .....	.....	4,274 18	3,600 63	670 36	6 0
3	Quebec	7,288 86	7,492 59	1,543 06	.....	.....
4	Ontario	3,136 15	.....	2,976 83	195 00	800 0
5	British Columbia....	.....	.....	.....	.....	.....
	Totals.....	32,466 43	18,672 57	8,120 52	900 10	847 9

Expenditure on Account TUG SERVICE

		I.		I.		I.		I.		II.	
1	Quebec.....	127	6,000 00	161	6,000 00	186	6,000 00	130	6,000 00	155 337	6,094
2	Ontario.....	127	6,000 00	161	6,000 00	186	6,000 00	130	6,000 00	155 337	6,094
	Totals	12,000 00	12,000 00	12,000 00	12,000 00	12,188

MISCEL

Stationery, &c.....	II. 337	1,264
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HOUSES—Construction—for the undermentioned years.

30th June.										Total for Ten Years to 30th June, 1877.	Number
1873.		1874.		1875.		1876.		1877.			
	\$ cts.		\$ cts.		\$ cts.		\$ cts.		\$ cts.		
.....	12,218 44	.....	.....	.....	.....	.....	.....	.....	.....	41,242 31	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,551 17	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16,324 51	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7,107 98	4
.....	.....	.....	2,362 54	.....	.....	.....	.....	.....	.....	2,362 54	5
.....	12,218 44	.....	2,362 54	.....	.....	.....	.....	.....	.....	75,588 51	

between Montreal and Kingston.

I.		II.		II.							
38	6,633 22	148	6,000 00	170	6,023 72	.....	.....	.....	.....	48,151 43	1
20	6,033 22	148	6,000 00	170	6,023 71	.....	.....	.....	.....	48,151 41	2
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	12,066 44	.....	12,000 00	.....	12,047 43	.....	.....	.....	.....	96,302 84	

NEOUS.

.....	II.										
.....	207	101 63	.....	.....	.....	.....	.....	.....	.....	1,365 70	

STATEMENT showing amounts contributed by Municipalities, &c., towards
Statements, from 1st July

Number.	Work.	1871.		1872.	
		I.	\$ cts.	II.	\$ cts.
	Harbours—				
1	Bayfield (Municipality of Stanley).....				
2	Cobourg (Commissioners Harbour Trust, Cobourg).....				
3	Collingwood (Northern Railway Co.).....				
4	Goderich (Municipality Township of Goderich).....				
5	Meaford (do St. Vincent)				
	Total Harbours.....				
	Rivers—				
6	Napanee River, Ont.....				
7	Salmon do	198	2,400 00		
	Total Rivers.....		2,400 00		
	Roads and Bridges—				
8	Portage du Fort Bridge (Grant by Government, Ont.).....			252	1,500 00
	Grand Totals		2,400 00		1,500 00

construction of the undermentioned Works, and included in previous 1867, to 30th June, 1877.

Year ended 30th June.										Total.	Number.
1873.		1874.		1875.		1876.		1877.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ ets.	
.....				.....		.....		254	10,000 00	10,000 00	1
.....				.....		.....		254	25,507 49	25,507 49	2
.....		190	15,505 00	237	12,763 26	.....				28,268 26	3
.....				239	10,000 00	.....				10,000 00	4
.....				238	10,000 00	.....				10,000 00	5
.....			15,505 00	.....	32,763 26	.....			35,507 49	83,775 75	
.....						251	5,000 00	.....		5,000 00	6
.....										2,400 00	7
.....							5,000 00	.....		7,400 00	
44	4,000 00	.....								5,500 00	8
....	4,000 00	.....	15,505 00	.....	32,763 26	.....	5,000 00	.....	35,507 49	96,675 75	

COMPARATIVE STATEMENT of Expenditure on

Number.	Name of Work.	Year			
		1868.	1869.	1870.	1871.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.
1	Railways—Construction.....	483,353 65	282,615 18	1,729,381 49	2,946,930 4
2	do Working expenses.....	359,961 08	387,548 47	445,208 75	442,993 3
3	Canals—Construction.....	128,965 35	126,953 20	105,588 26	133,872 8
4	do Staff and Repairs.....	246,221 14	261,965 18	301,486 69	302,383 3
	Totals, Railways and Canals.....	1,218,501 22	1,059,082 03	2,581,665 19	3,826,180 0
5	Public Buildings—Construction.....	105 960 71	113,453 74	73,514 72	410,101 0
6	do Repairs, &c.....	47,323 60	68,427 24	73,375 51	76,344 6
7	Harbours and Breakwaters.....	8,650 55	4,442 35	4,034 63	27,977 0
8	Improvements of Rivers.....				4,983 1
9	Dredges—Construction.....			8,873 67	25,083 7
10	Dredging.....	6,827 72			1,788 8
11	Slides and Booms—Construction.....	4,398 85	3,243 60	300 00	3,781 8
12	do Staff and Repairs.....	50,525 35	49,095 12	61,090 30	71,919 1
13	Roads and Bridges.....	35,980 51	25,302 67	155,088 94	170,253 3
14	Telegraph Lines—Construction.....				
15	do Working Expenses.....				
16	Lighthouses—Construction.....	32,466 43	18,672 57	8,120 52	900 0
	Miscellaneous, viz.:—				
17	Surveys.....	6,305 66	8,367 52	7,853 03	16,918 0
18	Arbitrations.....	2,416 66	1,000 00	7,489 78	5,563 0
19	Tug Service between Montreal and Kingston	12,000 00	12,000 00	12,000 00	12,000 0
20	Agent and Contingencies, B.C.....				
21	Sundries.....				
	Totals, Public Works.....	312,856 04	304,004 81	411,741 10	827,615 0
	Grand Totals.....	1,531,357 26	1,363,086 84	2,993,406 29	4,653,795 0

a. b. c. d.—For remarks, see pages 72 and 73.

Public Works for the undermentioned years.

ended 30th June.						Total for Ten Years to 30th June, 1877.	Number.
1872.	1873.	1874.	1875.	1876.	1877.		
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
5,620,569 67	5,763,268 81	3,925,123 69	5,018,427 85	4,497,434 75	3,209,502 16	33,476,607 70	1
595,076 22	1,011,892 60	1,847,925 24	1,581,934 24	1,497,128 22	1,890,268 80	10,059,936 93	2
290,073 52	383,916 82	1,240,628 96	1,715,309 37	2,389,544 21	4,131,396 60	10,646,249 18	3
302,240 72	368,341 42	414,771 00	401,877 23	402,907 40	350,926 19	3,353,120 32	4
6,807,960 13	7,527,419 65	7,428,448 89	8,717,548 69	8,787,014 58	9,582,093 75	57,535,914 13	
578,936 80	422,030 11	600,962 73	800,812 38	1,075,483 24	736,240 29	4,917,495 77	5
121,834 58	187,820 75	259,788 91	277,199 58	243,022 19	246,247 54	1,601,384 55	6
185,481 25	342,909 99	346,668 68	440,911 30	599,014 49	401,832 70	(a) 2,361,923 03	7
2,985 90	37,300 27	68,020 26	104,810 84	61,125 83	27,385 78	(b) 306,612 07	8
13,778 62	37,063 20	53,473 86	103,499 43	26,545 68	3,142 99	271,461 21	9
7,960 07	39,180 52	44,426 57	51,941 75	68,841 75	79,306 50	300,273 86	10
64,800 80	59,046 65	89,215 86	20,986 87	25,438 60	120 00	271,333 03	11
74,532 45	63,427 96	90,849 93	116,619 92	66,335 64	69,011 79	713,407 57	12
333,793 95	278,854 67	436,192 03	180,760 48	108,729 32	27,118 54	(c) 1,752,074 46	13
.....	72 00	.....	9,044 00	.....	.....	9,116 00	14
.....	51,990 77	29,994 52	39,720 87	43,275 70	33,055 40	198,037 26	15
847 91	12,218 44	2,362 54	.....	.....	.....	(d) 75,588 51	16
12,437 29	29,192 15	40,112 34	35,006 01	42,920 10	37,405 77	236,518 72	17
4,329 90	6,926 72	8,922 82	5,222 95	5,169 28	6,234 20	53,276 11	18
12,188 97	12,066 44	12,000 00	12,047 43	.....	.....	96,302 84	19
.....	.....	.....	.....	2,506 83	2,548 52	5,055 35	20
1,264 07	.....	101 63	.....	.....	.....	1,365 70	21
1,415,172 56	1,580,100 64	2,083,092 68	2,198,583 81	2,368,408 65	1,669,650 02	13,171,226 04	
8,223,132 69	9,107,520 29	9,511,541 57	10,916,132 50	11,155,423 23	11,251,743 77	70,707,140 17	

GENERAL ABSTRACT of Expenditure on PUBLIC WORKS and BUILDINGS

Number.	WORKS.	Nova Scotia.	ENTERED CONFEDERATION.		New Brunswick.
			1st July, 1873.		
			P. E. Island.		
		\$ cts.	\$ cts.	\$ cts.	
1	Intercolonial Railway—Construction.....	6,136,878 97	.....	10,881,888 4	
2	do Working expenses.....	2,453,723 37	.....	4,353,261 7	
3	Nova Scotia and New Brunswick—Construction.....	1,801,461 89	.....	824,689 2	
4	do do Working expenses.....	1,406,933 37	.....	823,854 4	
5	Prince Edward Island Railway—Construction.....	.....	288,632 73	.....
6	do Working expenses.....	.....	498,620 30	.....
7	Pacific Railway—Construction.....	.....	.....	.....
8	Canals do.....	212,909 24	.....	43,867 5	
9	do Staff and repairs.....	19,053 96	.....	.....
	Total Railways and Canals.....	12,030,965 80	787,253 03	16,927,561 4	
10	Public Buildings—Construction.....	154,267 13	73,385 62	383,316 8	
11	do Repairs, &c.....	47,175 01	9,926 88	32,882 2	
12	Harbours and Breakwaters.....	561,873 00	56,011 53	298,517 7	
13	Improvements of Rivers.....	9,998 76	.....	40,376 9	
14	Dredges—Construction.....	101,061 40	23,582 07	101,061 4	
15	Dredging.....	81,243 99	31,940 92	91,488 1	
16	Slides and Booms—Construction.....	.....	.....	.....
17	do Staff and Repairs.....	.....	.....	.....
18	Roads and Bridges.....	1,509 92	.....	2,368 1	
19	Telegraph Lines—Construction.....	.....	.....	.....
20	do Working expenses.....	.....	6,813 31	.....
21	Lighthouses—Construction.....	41,242 31	.....	8,551 1	
	Miscellaneous, viz. :				
22	Surveys.....	27,785 28	1,237 20	33,487 8	
23	Arbitrations.....	.....	.....	.....
24	Tug Service between Montreal and Kingston.....	.....	.....	.....
25	Agent and Contingencies, British Columbia.....	.....	.....	.....
26	Sundries.....	.....	.....	.....
	Total Public Works.....	1,026,156 80	202,897 53	992,050 0	
	Grand Totals.....	13,057,122 60	990,150 56	17,919,611 4	

(a) Including \$83,775.75 contributed by Municipalities, &c.—See page 69.

(b) do 7,400.00 do do do 69.

(c) do 5,500.00 do Local Government, Ontario—See page 69.

from 1st July, 1867, (date of Confederation) to 30th June, 1877.

Quebec.	Ontario	ENTERED CONFEDERATION.			Miscellaneous not Apportioned to any of the Provinces.	Totals.	Number.
		1st July, 1870.		20th July, 1871.			
		Manitoba.	North-West Territories.	British Columbia.			
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
5,567,477 84						22,586,245 30	1
523,543 71						7,330,528 80	2
						2,626,151 17	3
						2,230,787 83	4
						288,632 73	5
						498,620 30	6
	3,930,137 25	1,612,055 49	848,140 40	1,585,245 36		7,975,578 50	7
4,234,654 12	6,121,004 14		32,675 65		1,138 50	10,646,249 18	8
1,329,556 81	1,957,368 50				47,136 05	3,353,120 32	9
11,655,232 48	12,008,509 89	1,612,055 49	880,816 05	1,585,245 36	48,274 55	57,535,914 13	
1,314,065 90	2,378,079 87	222,730 61	141,699 97	210,021 97	39,928 16	4,917,495 77	10
157,697 55	1,318,912 97	28,628 38	100 00	5,406 53	655 00	1,601,384 55	11
129,114 26	1,316,406 48					(a) 2,361,923 03	12
175,497 51	64,004 27	5,234 90		11,499 69		(b) 306,612 07	13
	38,058 37			7,697 96		271,461 21	14
16,570 88	22,258 88			56,771 09		300,273 86	15
233,803 74	37,529 29					271,333 03	16
434,783 83	278,623 74					713,407 57	17
95,719 61	1,211,632 35	440,844 24				(c) 1,752,074 46	18
		72 00		9,044 00		9,116 00	19
				191,223 95		198,037 26	20
16,324 51	7,107 98			2,362 54		(d) 75,588 51	21
47,318 88	125,638 31		681 99	369 50		236,518 72	22
48,151 43	48,151 41				53,276 11	53,276 11	23
						96,302 84	24
				5,055 35		5,055 35	25
					1,365 70	1,365 70	26
2,669,048 10	6,846,403 92	697,510 13	142,481 96	499,452 58	95,224 97	13,171,226 04	
14,324,280 58	18,854,913 81	2,309,565 62	1,023,298 01	2,084,697 94	143,499 52	70,707,140 17	

(d) Shows only expenditure made through Public Works Department, the construction of such Lighthouses as will cost less than \$10,000 having been transferred to the Department of Marine and Fisheries by Order in Council (No. 9728), dated 28th February, 1870.

O. DIONNE,
Accountant.

EXPENDITURE on account of Works authorized by SPECIAL

Work.	Authority.	Amount Authorized.
		\$ cts.
St. Lawrence River (deepening between Quebec and Montreal).....	30 Vic., c. 60, 23rd May, 1873	1,500,000 00
Quebec Harbour Improvements.....	36 Vic., c. 62, 23rd May, 1873	1,200,000 00

ACTS of Parliament, from 1st July, 1867, to 30th June, 1877.

Year ended 30th June.								Totals.
1874.		1875.		1876.		1877.		
	\$ cts.		\$ cts.		\$ cts.		\$ cts.	\$ cts.
XIIa	275,000 00	XII	269,000 00	XI	192,000	XIX	122,000 00	858,000 00
XIIa	724,140 00	.....	.....	.....	.....	.....	.....	724,140 00
	999,140 00		269,000 00		192,000 00		122,000 00	1,582,140 00

EXPENDITURE on RAILWAYS
CONSTRUCTED

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$ cts.	\$ cts.
1	Intercolonial.....		22,586,245 30	200	408,816 74
2	Nova Scotia.....		1,801,461 89		
3	European and North American, N.B.....		824,689 28		
4	Prince Edward Island.....		288,632 73	200	6,551 86
5	Pacific.....		7,975,578 50	222	2,228,373 13
6	Côteau Landing Railway Bridge.....				
	Totals.....		33,476,607 70	.....	2,643,741 73

WORKING

1	Intercolonial.....		7,330,528 80	247	1,811,273 56
2	Nova Scotia.....		1,406,933 37		
3	European and North American, N.B.....		823,854 46		
4	Prince Edward Island.....		498,620 30	248	221,599 49
5	Pacific.....				
	Totals.....		10,059,936 93	.....	2,032,873 05

YEARLY Expenditure
CONSTRUCTED
NOVA SCOTIA

1	St. Peter's.....		138,433 09	II.	
2	do Enlarging and Deepening....		74,476 15	195	26,511 51
	Totals.....		212,909 24	26,511 51

NEW

1	Baie Verte.....		43,867 53	
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QU

1	Lachine.....	Jac. Cartier & Hochelaga	228,770 58		
2	do Enlargement.....	do	1,990,188 15	193	1,484,619 62
3	Beauharnois.....	Beauharnois.....			
4	do Land Damages.....	do	68,488 25		
5	Ste. Anne's Lock.....	Jacques Cartier.....	102,799 48	194	14,618 80
6	Carillon and Grenville.....	Argenteuil.....	74,071 52		
7	do Enlargement.....	do	1,110,992 11		
8	Carillon & Chute à Blondeau Dam,&c	do	320,613 02	195	22,676 20
9	Oulbute Rapids Lock.....	Pontiac.....	235,808 12	195	5,933 50
10	Chambly.....	St. John and Chambly....	10,810 25		
11	St. Lawrence (proportion of Exp'ture)		92,112 64	194	2,785 20
	Totals.....		4,234,654 12	.....	1,530,633 40

for the undermentioned years.
TION.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
219	226,639 19	219	2,048,014 60	234	608,732 80	241	585,568 79	26,464,017 42	1
.....	.....	.....	.....	.....	.....	.....	.....	1,801,461 89	2
.....	.....	.....	.....	.....	.....	.....	.....	824,689 28	3
220	40,129 05	220	16,539 82	.....	.....	241	402 03	352,255 49	4
243	2,240,285 47	226	4,044,522 72	240	4,968,503 93	245	4,590,861 99	26,048,125 74	5
.....	.....	248	522 00	.....	.....	295	.....	522 00	6
.....	2,507,053 71	.....	6,109,599 14	.....	5,577,236 73	.....	5,176,832 81	55,491,071 82	

EXPENSES.

273	2,010,183 22	257	1,607,956 70	287	1,780,353 53	305	2,080,592 37	16,620,888 18	1
.....	.....	258	.....	.....	.....	.....	.....	1,406,933 37	2
.....	.....	.....	.....	.....	.....	.....	.....	823,854 46	3
273	223,313 12	257	164,640 55	287	203,122 88	305	228,259 97	1,539,556 31	4
.....	.....	258	78,892 01	287	236,944 98	305	2,570 88	318,407 87	5
.....	2,233,496 34	.....	1,851,489 26	.....	2,220,421 39	.....	2,311,423 22	20,709,640 19	

n CANALS.

TION.

COTIA.

II.	.....	II.	.....	II.	.....	II.	.....	138,433 09	1
216	107,337 75	214	80,120 54	230	69,434 76	234	484 00	358,364 71	2
.....	107,337 75	80,120 54	230	69,434 76	484 00	496,797 80	

RUNSWICK.

.....	278	520 00	44,387 53	1
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EC.

.....	295	2,978 66	231,749 24	1
14	958,053 30	212	369,566 74	225	292,165 51	230	252,821 33	5,347,414 66	2
.....	.....	213	266 15	.....	.....	.....	.....	266 15	3
.....	.....	.....	.....	.....	.....	.....	.....	68,488 25	4
14	22,113 02	213	3,054 68	228	69,042 76	233	193,158 36	404,787 15	5
.....	.....	.....	.....	.....	.....	.....	.....	74,071 52	6
15	218,625 24	214	78,297 58	229	145,380 97	233	220,290 32	1,773,586 22	7
15	24,516 00	213	203,216 69	229	191,326 56	233	212,794 07	975,142 54	8
15	20,694 19	214	16,688 20	229	4,721 62	234	29,567 15	313,412 81	9
.....	.....	.....	.....	.....	.....	295	31,796 41	42,606 66	10
14	4,632 88	213	4,607 28	226	3,463 98	239	14,466 73	122,068 74	11
.....	1,248,634 63	.....	675,697 32	.....	706,101 40	.....	957,873 03	9,353,593 94	

EXPENDITURE on CANALS for
CONSTRUC
ONTA

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
			\$ cts.	II.	\$ cts.
1	Cornwall.....	Stormont.....	44,057 55	.....	.....
2	do Enlargement.....	do.....	49,211 37	194	145,015 45
3	Williamsburgh.....	Grenville and Dundas....	1,077 00	.....	.....
4	Welland.....	Haldimand, Welland and Lincoln.....	172,122 90	.....	.....
5	do Enlargement.....	do do	5,707,746 67	198	2,138,392 99
6	Rideau.....	Frontenac, Leeds, Gren- ville and Carleton.....	59,564 81	.....	.....
7	Burlington Bay.....	Wentworth.....	.....	.....	.....
8	Murray—Survey.....	Northumberland.....	400 00	.....	.....
9	Sault Ste. Marie—Survey.....	Algoma District.....	949 35	.....	.....
10	St. Lawrence (proportion of expendi- ture).....	.....	85,874 49	194	2,785 23
11	River Tay—Survey.....	.....	.....	.....	.....
12	Trent.....
	Totals.....	6,121,004 14	2,286,193 67

NORTH-WEST

Canal and Land Surveys.....	32,675 65
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GENERAL

.....	1,138 50
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ABSTRACT STATEMENT of Expenditure

1	Nova Scotia.....	212,909 24	26,511 51
2	New Brunswick.....	43,867 53
3	Quebec.....	.....	4,234,654 12	.....	1,530,633 44
4	Ontario.....	.....	6,121,004 14	.....	2,286,193 67
5	North-West Territories.....	.....	32,675 65	.....	.....
6	Generally.....	.....	1,138 50	.....	.....
	Totals.....	.....	10,646,249 18	.....	3,843,338 62

CANALS—MAINTENANCE
NOVA

1	St. Peter's— Staff.....	.....	3,376 16	II. 245	600 00
2	Repairs.....	.....	15,682 80	.....	.....
	Totals.....	.....	19,058 96	.....	600 00

the undermentioned years—*Continued.*

ION—*Concluded.*

IO.

Year ended 30th June.								Total for 15 years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
214	143,092 05	213	109,454 95	226	53,948 14	230	44,587 61	44,057 55	1
								545,309 57	2
								1,077 00	3
				278	6,593 19	295	13,664 80	192,380 89	4
218	1,552,697 41	216	1,252,924 75	228	1,242,943 37	232	603,402 17	12,498,107 36	5
215	7,703 88			275	133 50			67,402 19	6
				275	15,967 60	295	14,459 29	30,426 89	7
						234	7,135 63	7,535 63	8
								949 35	9
214	4,632 89	213	4,607 28	226	3,463 98	230	14,466 72	115,830 59	10
						296	748 65	748 65	11
		213	561 50			295	5,836 51	6,398 01	12
....	1,708,126 23	1,367,548 48	1,323,049 78	704,301 38	13,510,223 68	

ERRITORIES.

								32,675 65	
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ALLY.

			219	1,136 84	295	7,610 33	9,885 67	
--	--	--	-----	----------	-----	----------	----------	--

iture on CANALS—Construction.

	197,337 75		80,120 54		69,434 76		484 00	496,797 80	1
					520 00			44,387 53	2
	1,248,634 63		675,697 32		706,101 40		957,873 03	9,353,593 94	3
	1,708,126 23		1,367,548 48		1,323,049 78		704,301 38	13,510,223 68	4
								32,675 65	5
					1,136 84		7,610 33	9,885 67	6
	3,064,098 61		2,123,366 34		2,100,242 78		1,670,268 74	23,447,564 27	

AND REPAIRS, &c.

COTIA.

II. 269	631 50	II. 253	400 00	II. 265	959 58	II. 300	1,920 54	7,887 78	1
						300	200 63	15,883 43	2
	631 50		400 00		959 58		2,121 17	23,771 21	

EXPENDITURE on CANALS for
MAINTENANCE,
QUE

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
	Lachine—	Jac. Cartier & Hochelaga	\$ cts.		
1	Collection		95,324 12	243	10,007 18
2	Staff		222,291 71	243	39,062 97
3	Repairs		199,362 26	243	13,646 41
4	Refunds		650 57	248	666 90
	Totals		517,628 66	.....	63,383 46
	Beauharnois—	Beauharnois—			
5	Collection		8,848 63	242	1,001 87
6	Staff		124,049 59	243	14,383 37
7	Repairs		106,059 92	243	9,861 05
8	Refunds		65 02	.....	.....
	Totals		239,023 16	.....	25,246 29
	St. Anne's Lock—	Jacques Cartier—			
9	Collection		7,967 30	245	946 55
10	Staff		15,978 83	245	2,057 32
11	Repairs		25,289 35	245	541 95
	Totals		49,235 48	.....	3,545 82
	Carillon and Grenville—	Argenteuil—			
12	Collection		7,436 24	244	1,268 97
13	Staff		89,442 86	244	11,401 30
14	Repairs		114,062 12	244	5,082 72
15	Refunds		703 58	249	69 74
	Totals		211,644 80	.....	17,822 73
	St. Ours Lock—	Richelieu—			
16	Collection		4,663 33	245	590 18
17	Staff		16,321 44	245	1,556 65
18	Repairs		13,170 03	245	283 77
	Totals		34,156 80	.....	2,430 60
	Chambly—	St. Johns & Chambly—			
19	Collection		21,854 06	244	2,418 08
20	Staff		100,670 76	244	10,413 99
21	Repairs		155,319 97	244	6,022 96
22	Refunds		23 12	244	.....
	Totals		277,867 91	.....	18,855 03
	Culbute Rapids Lock—	Pontiac—			
23	Staff .....		.....	.....	.....
24	Repairs .....		.....	.....	.....
	Totals .....		.....	.....	.....
	Grand Totals		1,329,556 81	.....	131,283 93

the undermentioned years—*Continued.*

REPAIRS, &c.—*Continued.*

SEC.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
267	9,154 01	252	10,269 65	282	10,121 31	299	10,296 90	145,173 17	1
267	42,338 84	252	38,950 90	282	39,027 99	299	41,158 90	422,831 31	2
267	12,400 78	252	10,223 62	282	19,888 33	299	17,116 46	272,637 86	3
274	159 29	258	690 30	287	340 26	.....	.....	2,507 32	4
.....	64,052 92	.....	60,134 47	.....	69,377 89	.....	68,572 26	843,149 66	
267	978 26	251	1,092 37	281	1,010 01	298	1,604 77	14,535 91	5
267	15,015 86	251	15,362 61	281	17,659 93	298	18,804 53	205,275 89	6
267	10,370 71	251	8,997 34	281	10,770 67	298	20,813 86	166,873 55	7
.....	.....	.....	.....	.....	.....	.....	.....	65 02	8
.....	26,364 83	.....	25,452 32	.....	29,440 61	.....	41,223 16	386,750 37	
270	945 17	253	942 46	283	942 93	301	1,247 52	12,991 93	9
270	2,202 03	253	2,152 57	283	2,553 02	301	2,611 30	27,555 07	10
270	3,259 70	253	1,704 71	283	3,257 92	301	2,343 99	36,397 62	11
.....	6,406 90	.....	4,799 74	.....	6,753 87	.....	6,202 81	76,944 62	
269	1,019 32	253	1,282 48	283	1,353 41	300	1,330 97	13,691 39	12
269	11,501 22	253	11,959 14	283	13,059 18	300	14,387 49	151,751 19	13
269	7,629 98	253	7,625 54	283	8,076 91	300	7,582 68	150,059 95	14
.....	.....	258	99 15	.....	.....	.....	.....	872 47	15
.....	20,150 52	.....	20,966 31	.....	22,489 50	.....	23,301 14	316,375 00	
270	615 99	254	624 00	283	602 60	301	615 69	7,713 79	16
270	1,581 55	254	1,614 01	283	1,741 97	301	2,002 71	24,818 33	17
270	456 07	254	705 54	283	1,299 77	301	1,902 41	17,817 59	18
.....	2,653 61	.....	2,943 55	.....	3,644 34	.....	4,520 81	50,349 71	
269	2,361 40	253	2,443 27	282	2,443 31	300	2,584 47	34,104 59	19
269	11,301 53	253	11,516 22	283	13,950 47	300	16,686 78	164,539 75	20
269	8,809 77	253	12,377 74	283	20,705 17	300	16,843 60	220,079 21	21
.....	.....	258	378 85	287	5 60	.....	.....	407 57	22
.....	22,472 70	.....	26,716 08	.....	37,104 55	.....	36,114 85	419,131 12	
.....	.....	255	202 50	285	962 85	301	790 00	1,955 35	23
.....	.....	255	259 31	.....	.....	301	162 33	421 64	24
.....	.....	.....	461 81	.....	962 85	.....	952 33	2,376 99	
.....	142,101 48	.....	141,474 28	.....	169,773 61	.....	180,887 36	2,095,077 47	

EXPENDITURE on CANALS
MAINTENANCE,
ONTA

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II	
			\$ cts.		\$ cts.
	Cornwall—				
1	Collection	Stormont.....	8,064 35	243	1,074 07
2	Staff	do	120,898 90	243	13,825 50
3	Repairs.....	do	71,873 95	243	4,935 21
4	Refunds.....	do	159 42		
	Totals.....		200,996 62		19,834 78
	Williamsburgh—				
5	Collection	Grenville and Dundas....	11,525 00	243	1,150 00
6	Staff	do	63,649 79	243	7,430 11
7	Repairs	do	67,796 48	243	4,449 78
8	Refunds.....	do	65 01		
	Totals.		143,036 28		13,029 89
	Welland—	Haldimand, Welland and			
9	Collection	Lincoln.....	63,670 94	242	6,747 68
10	Staff	do	463,080 06	242	60,138 59
11	Repairs.....	do	648,210 86	242	66,393 53
12	Refunds	do	6,819 61	248	862 65
	Totals		1,181,781 47		134,142 45
	Burlington Bay—				
13	Ferryman, &c.	Wentworth.....	3,556 87	242	300 00
14	Repairs.....	do	4,140 74	242	1,278 06
15	Refunds.....	do	75 41	248	24 56
	Totals.....		7,773 02		1,602 62
	Rideau—	Frontenac, Leeds, Gren-			
16	Collection	ville and Carleton.....	13,574 73	241	2,094 85
17	Staff	do	231,225 07	241	26,651 51
18	Repairs.....	do	178,569 28	241	11,034 22
19	Refunds.....	do	412 03	249	25 00
	Totals.....		423,781 11		39,805 58
	Trent Works—				
20	Staff				
21	Repairs.....				
	Totals.....				
22	Fort Frances Locks.....				
	Grand Totals.....		1,957,368 50		208,415 32

for the undermentioned years—*Continued.*REPAIRS, &c.—*Continued.*

RIO.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
268	1,077 85	252	1,071 27	281	1,086 85	299	1,173 35	13,547 74	1
268	13,817 96	252	14,440 33	281	15,173 60	299	15,052 20	193,208 49	2
268	4,983 15	252	9,735 76	281	5,524 10	299	6,634 62	103,686 79	3
274	216 25	.....	.....	.....	.....	.....	.....	375 67	4
.....	20,095 21	.....	25,247 36	.. ...	21,784 55	.....	22,860 17	310,818 69	
268	1,150 00	252	1,150 00	282	1,150 00	299	1,150 00	17,275 00	5
268	7,517 20	252	7,590 15	282	7,572 35	299	7,589 44	101,349 04	6
268	3,549 71	252	3,999 77	282	5,020 73	299	7,447 69	92,264 16	7
.....	.....	.....	.....	.....	.....	.....	.....	65 01	8
.....	12,216 91	.....	12,739 92	.....	13,743 08	.....	16,187 13	210,953 21	
266	7,402 20	251	7,389 48	281	7,543 69	298	7,321 71	100,075 70	9
266	59,942 23	251	63,198 10	281	56,398 04	298	74,641 51	777,398 53	10
266	56,755 57	255	76,535 25	281	69,249 53	298	84,374 97	1,001,519 71	11
274	218 01	258	162 97	287	13 80	.....	.....	8,077 04	12
.....	124,318 01	.....	147,285 80	.....	133,205 06	.....	166,338 19	1,887,070 98	
269	302 62	253	300 00	283	300 00	300	300 00	5,059 49	13
269	448 06	253	3,519 80	.....	.....	300	240 62	9,627 28	14
.....	.....	.....	.....	.....	.....	.....	.....	99 97	15
.....	750 68	.....	3,819 80	.....	300 00	.....	540 62	14,786 74	
266	2,111 20	250	2,053 66	280	2,123 97	297	2,113 01	24,071 42	16
266	26,042 52	250	26,463 88	280	26,024 71	297	26,915 29	363,322 98	17
266	7,134 55	250	11,434 05	280	8,627 00	297	13,860 28	230,659 38	18
.....	.....	258	61 71	287	307 62	.....	.....	806 36	19
.....	35,288 27	.....	40,013 30	.....	37,083 30	.....	42,888 58	618,860 14	
.....	.....	255	1,188 92	285	2,489 93	301	2,011 92	5,690 77	20
.....	.....	248	.....	.....	.....	.....	.....	.....
.....	.....	255	3,568 89	285	2,233 50	301	8,115 50	13,917 89	21
.....	.....	.....	4,757 81	.....	4,723 43	.....	10,127 42	19,608 66	
.....	.....	.....	.....	.....	.....	296	2,559 41	2,559 41	22
.....	192,669 08	.....	233,863 99	.....	210,839 42	...	261,501 52	3,064,657 83	

EXPENDITURE on CANALS

MISCELLANEOUS

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$ cts.	\$ cts.
1	Miscellaneous.....		47,136 05		

ABSTRACT STATEMENT of Expenditure

1	Nova Scotia.....		19,058 96	600 00
2	Quebec.....		1,329,556 81	131,283 93
3	Ontario.....		1,957,368 50	208,415 32
4	Miscellaneous.....		47,136 05	
	Totals.....		3,353,120 32	340,299 25

YEARLY Expenditure on

CONSTRUCTING

NOVA

			II.	
1	Halifax Dominion Building.....	Halifax, city.....	84,000 00	
2	do Quarantine Station (Lawlor's Island)	do	24,941 44	
3	Lunenburg Marine Hospital.....	Lunenburg.....		
4	Pictou Custom House	Pictou	25,060 05	
5	do Marine Hospital.....	do		
6	do Quarantine Station.....	do	4,090 00	
7	Sydney Marine Hospital.....	Cape Breton	9,276 57	227
8	do Quarantine Station	do	16 95	232
9	Yarmouth Marine Hospital	Yarmouth.....	3 550 00	662 71
10	do Quarantine Station.....	do	3,332 12	
	Totals.....		154,267 13	662 71

PRINCE EDWARD

1	Charlottetown Dominion Building ..	Queen's	69,000 00	
2	do Marine Hospital.....	do		
3	Souris Marine Hospital.	King's	4,385 62	
	Totals.....		73,385 62	

for the undermentioned years—*Concluded.*

ON CANALS.—Maintenance, &c.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
		248							
		254							
.....	255	3,765 28	283	2,390 74	301	2,459 09	55,751 16	1

on STAFF, REPAIRS, &c.

.....	631 50	.....	400 00	.....	959 58	.....	2,121 17	23,771 21	1
.....	142,101 48	.....	141,474 28	.....	169,773 61	.....	180,887 36	2,095,077 47	2
.....	192,669 08	.....	233,863 99	.....	210,839 42	.....	261,501 52	3,064,657 83	3
.....		.....	3,765 28	.....	2,390 74	.....	2,459 09	55,751 16	4
.....	335,402 06	.....	379,503 55	.....	383,963 35	.....	446,969 14	5,239,257 67	

PUBLIC BUILDINGS.
TION.
SCOTIA.

II.		II.		II.		II.			
.....		.....		253	363 37	.....		84,363 37	1
.....		.....		253	327 70	.....		25,269 14	2
248	77 31	232	3,541 64	253	2,883 30	.....		6,502 25	3
.....		.....		.....		256	1,613 00	25,060 05	4
.....		.....		.....		.....		1,613 00	5
.....		.....		.....		.....		4,090 00	6
.....		.....		.....		.....		9,939 28	7
.....		.....		253	30 50	256	236 82	284 27	8
.....		.....		.....		.....		3,550 00	9
.....		249	106 52	.....		.....		3,438 64	10
.....	77 31	.....	3,648 16	.....	3,604 87	.....	1,849 82	164,110 00	

ISLAND.

			II.		II.		69,000 00	1
			253	1,800 00	260	68 06	1,868 06	2
							4,385 62	3
				1,800 00		68 06	75,253 68	

EXPENDITURE on PUBLIC BUILDINGS
CONSTRUCTED
NEW

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1848.	
				II.	\$ cts.
1	Chatham Custom House.....	Northumberland	\$ cts. 12,991 77		
2	do Post Office.....	do			
3	Dorchester Penitentiary.....	Westmorland	42,154 22	226	64,045 07
4	Fredericton Post Office.....	York			
5	Middle Island or Miramichi Quarantine Station.....	Northumberland	4,173 70		
6	Newcastle Custom House.....	do	4,830 00		
7	St. Andrew's Marine Hospital.....	Charlotte.....	5,583 44		
8	do Quarantine Station.....	do	330 00		
9	St. John Custom House (old).....	St. John City.....	75,797 88		
10	do do (new).....	do		226	18,832 02
11	do Marine Hospital, Partridge I'd	do			
12	do Military Storehouse, &c.....	do		226	7,405 99
13	do Post Office (old).....	do	178,940 86		
14	do do (new).....	do		226	7,895 45
15	do Quarantine Station, Partridge Island	do	7,308 46		
16	do Savings Bank (old).....	do	47,784 28		
17	do do (new).....	do		226	470 64
18	Sussex Post Office, Custom House, &c	King's.....			
19	Westcock Marine Hospital	Westmorland	3,416 93		
20	Woodstock Post Office, Custom House	Carleton.....			
Totals.....			383,316 54		98,649 17

QUE

1	Argenteuil Court House.....	Argenteuil	1,377 20		
2	Beauharnois Gaol.....	Beauharnois	178 66		
3	Chicoutimi Marine Hospital	Chicoutimi			
4	Grosse Isle Quarantine Station.....	Montmagny.....	34,785 01	226	4,942 50
5	Hull Post Office.....	Ottawa.....			
6	Kamouraska Gaol.....	Kamouraska	61 80		
7	Lévis Fortifications.....	Lévis			
8	do Immigrant Shed.....	do	20,463 20		
9	Malbaie Court House and Gaol.....	Charlevoix	228 50		
10	Montreal Custom House.....	Montreal City.....	219,610 76		
11	do Examining Warehouse	do	185,276 07	225	18,533 75
12	do Immigrant Shed	do	17,811 15		
13	do Inland Revenue Offices.....	do			
14	do Post Office	do	460,426 38	225	30,166 98
15	do Purchase of Land.....	do	105,724 56		
16	Quebec Artillery Barracks.....	Quebec City			
17	do Cartridge Factory.....	do			
Carried forward.....			1,045,948 29		53,643 23

for the undermentioned years—*Continued.*TION—*Continued.*

BRUNSWICK.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880		1881.		1882.			
IL.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
248	790 00							12,991 77	1
								790 00	2
249	63,734 72	233							
247	1,971 28	235	27,251 93	262	73,274 17	256	55,625 70	326,085 81	3
		231	19,358 88	251	6,070 64	257	3,120 77	30,521 57	4
								4,173 70	5
								4,830 00	6
								5,588 44	7
								330 00	8
								75,797 88	9
247	54,230 97	231	160,478 08	249	58,415 77	257	24,823 05	316,779 89	10
				253					
				253	1,372 50	258	861 43	2,233 93	11
247	74 88					259	2,000 00	9,480 87	12
								178,940 86	13
247	29,702 19	231	53,799 09	250	47,477 71	259	29,486 62	168,361 06	14
								7,308 46	15
								47,784 28	16
				251					
247	36,281 54	231	5,373 13	253	2,896 72			45,022 03	17
						260	1,918 30	1,918 30	18
								3,416 93	19
				252	4,636 00	258	1,680 22	6,316 22	20
	186,785 58		266,261 11		194,143 51		119,516 09	1,248,672 00	

BEC.

								1,377 20	1
								178 66	2
		233							
		239	301 76			255	748 15	1,049 91	3
				245	2,554 13	252	14,421 60	56,703 24	4
						255	793 59	793 59	5
								61 80	6
		229	6,624 08	246	2,720 14	252	3,831 08	13,175 30	7
								20,468 20	8
								228 50	9
						256	4,071 00	223,681 76	10
246	8,466 25	230	10,130 17	248	576 79	253	2,447 72	225,430 75	11
								17,811 15	12
						253	10,353 87	10,353 87	13
								490,593 36	14
								105,724 56	15
						271			
				247	1,649 74	294	3,010 07	4,659 81	16
						294	12,018 76	12,018 76	17
	8,466 25		17,056 01		7,500 80		51,695 84	1,184,310 42	

EXPENDITURE on PUBLIC BUILDINGS
CONSTRUCTED
QUEBEC—

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$ cts.	\$ cts.
	Brought forward.....		1,045,948 29	II.	53,643 23
18	Quebec Citadel.....	Quebec City.....			
19	do do "Cliff".....	do			
20	do do Buildings.....	do			
21	do Custom House.....	do	1,331 60		
22	do Durham Terrace Extension...	do			
23	do Fortifications	do			
24	do Marine Hospital.....	do	9,008 35		
25	do New Gaol.....	do	2,687 25		
26	do Observatory (rebuilding).....	do	8,767 76		
27	do Post Office	do	105,088 49		
28	Sherbrooke Immigrant Station.....	Sherbrooke	1,334 40		
29	do New Gaol.....	do	6,833 63		
30	do Post Office.....	do			
31	St. Helen's Island Military Buildings	Montreal City.....			
32	St. John's Post Office.....	St. John.....		226	1,714 28
33	St. Vincent de Paul Penitentiary....	Laval	122,531 54	228	7,281 96
34	Three Rivers Custom House	Three Rivers City	10,534 68		
35	do Old Barracks.....	do			
	Totals, Quebec		1,314,065 90		62,639 47

ONTA

1	Algoma Court House and Jail	Algoma	5,041 13		
2	Belleville Post Office, Custom House, &c.	Hastings, East.....			
3	Brantford do do	North Brant			
4	Brockville do do	Brockville			
5	Chatham do do	Kent			
6	Cornwall do do	Cornwall			
7	Guelph do do	South Wellington	13,111 74	223	13,788 26
8	Hamilton Immigrant Shed.....	Hamilton City			
9	do Post Office	do	17,508 67		
10	do do Custom House, &c. (new).....	do			
11	Kingston Fortifications and Military Buildings	Kingston City	101,723 15		
12	do Immigrant Buildings.....	do	4,024 08	224	
13	do Military College.....	do	20,483 98	231	43,591 61
14	do Penitentiary	do			
	Carried forward.....		161,892 75		57,379 87

for the undermentioned years—*Continued.*

ION—*Continued.*

Concluded.

Year ended 30th June.								Total for 15 years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	8,466 25	.....	17,056 01	...	7,500 80	.....	51,695 84	1,184,310 42	
.....		.....		247	2,831 00	254	9,745 13	12,576 13	18
.....		.....		247	(a) 26,727 54	254	10,377 61	37,105 15	19
.....		.....		.....		254	6,428 60	6,428 60	20
.....		.....		247	626 88	255	3,574 00	5,532 48	21
.....		.....		.....		253			
.....		229	2,086 40	246	14,101 50	255	18,529 11	34,717 01	22
.....		229	44,160 01	246	(b) 37,094 56	253	18,017 59	99,272 16	23
.....		.....		247	2,038 90	.....		11,047 25	24
.....		.....		.....		.....		2,687 25	25
.....		.....		.....		.....		8,767 76	26
.....		.....		.....		.....		105,088 40	27
.....		.....		.....		.....		1,334 40	28
.....		.....		.....		.....		6,833 63	29
.....		.....		248	8,588 75	253	5,806 09	14,394 84	30
.....		.....		.....		255			
.....		.....		.....		294	144 63	144 63	31
246		.....		.....		.....
255	4,075 00	230	4,391 33	248	3,774 23	272	1,525 00	15,479 84	32
.....		233		.....		.....
249	11,698 84	234	9,682 18	249	15,437 45	254	16,575 16	183,207 13	33
.....		.....		.....		.....		10,534 68	34
.....		.....		247		.....		
.....		.....		263	3,138 34	253	5,102 36	8,240 70	35
.....				
.....	24,240 09	.....	77,375 93	.....	121,859 95	.....	147,521 12	1,747,702 46	

IIO.

.....	.....	.....	.....	.....	.....	.....	5,041 13	1	
.....	
245	9,116 91	229	12,011 63	242	5,637 31	247	11,849 64	17,486 95	2
.....	.....	.....	.....	244	10,557 94	249	1,086 00	32,772 48	3
.....	.....	.....	.....	.....	.....	251	3,090 00	3,090 00	4
.....	.....	.....	.....	.....	.....	250	8,137 88	8,137 88	5
.....	.....	.....	.....	.....	.....	249	8,233 97	8,233 97	6
244	.....	.....	.....	.....	.....	.....	.....	.....	.....
254	4,741 82	.....	.....	.....	.....	.....	.....	31,641 82	7
.....	.....	.....	.....	.....	.....	251	1,450 00	1,450 00	8
.....	.....	.....	.....	.....	.....	.....	.....	17,508 67	9
.....
.....	.....	.....	.....	244	25 19	251	37,941 70	37,966 89	10
.....
.....	.....	228	3,051 40	243	6,706 24	.....	.....	111,480 79	11
.....	.....	.....	.....	.....	.....	.....	.....	4,024 08	12
.....	.....	.....	.....	242	.....	248	.....	.....	.....
245	23,404 27	228	3,900 00	245	6,016 41	294	4,660 03	102,056 30	13
250	10,906 43	234	5,387 18	243	14,109 11	248	8,340 53	38,743 25	14
.....
.....	48,169 43	.....	24,850 21	.....	43,652 20	.....	84,789 75	419,634 21	.....

(a) Including \$2,500 grant Corporation City of Quebec.

(b) do \$2,433.33, Her Majesty the Queen's gift.

YEARLY Expenditure on PUBLIC BUILDING
CONSTRUCTION
ONTARIO

Number.	Name of Work.		County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
				\$	cts.	II.	\$
	Brought forward.....			161,892	75		57,379
15	London	Custom House.....	London City	53,583	46		
16	do	Immigrant Shed.....	do	7,425	86		
17	do	Military Grounds.....	do			224	1,928
18	do	Post Office.....	do	6,768	17		
19	Ottawa	Drill Shed.....	Ottawa City				
20	do	Geological Museum.....	do				
21	do	Parliament and Departmental Buildings.....	do	1,161,799	44	199	170,120
22	do	Post Office.....	do	230,829	07	225	6,971
23	do	Supreme Court.....	do			230	
24	Point Edward	Cattle Quarantine Station.....	West Lambton				
25	Rideau Hall	.....	Russell	155,965	74		
26	St. Catharines	Marine Hospital.....	Lincoln and Niagara	2,000	00		
27	do	Post Office, Custom House, &c.	do				
28	St. Thomas	do do ..	East Elgin				
29	Stratford	do do ..	North Perth				
30	Toronto	Custom House.....	Toronto City	234,184	30		
31	do	Examining Warehouse.....	do	223,338	70	223	376
32	do	Immigrant Sheds.....	do	11,834	18		
33	do	Post Office.....	do	128,458	20	224	
34	Windsor	Post Office, Custom House, &c.	North Essex			230	20,195
	Totals.....			2,378,079	87		256,971

M

1	Brandon	Immigrant Shed.....	Brandon City				
2	Emerson	do	Provencher				
3	Stoney Mountain	Penitentiary.....	Lisgar	136,191	74		
4	Winnipeg	Assist. Receiver-General's Office.....	Winnipeg City				
5	Winnipeg	Custom House.....	do	38,642	88		
6	do	Dominion Lands Office.....	do	15,649	77		
7	do	Immigrant Shed.....	do	7,050	58		
8	do	Lt.-Governor's Residence.....	do				
9	do	Parliament Buildings.....	do				
10	do	Post Office.....	do	25,195	64		
	Totals.....			222,730	61		

the undermentioned years—*Continued.*TON—*Continued.*

cluded.

Year ended 30th June.						Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.			
\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	
48,169 43	.....	24,350 21	.....	43,052 20	.....	84,789 75	419,634 21
.....	.....	.....	.....	.....	.....	.....	53,583 46 15
.....	.....	.....	.....	.....	.....	.....	7,425 86 16
.....	.....	.....	.....	.....	.....	.....	1,928 33 17
.....	.....	.....	.....	.....	.....	.....	6,763 17 18
(a) 4,050 00	228	(b) 19,161 54	242	3,442 73	247	327 16	26,981 43 19
.....	229	1,428 17	259	39,240 51	252	10,073 12	50,741 80 20
.....	.....	.....	.....	.....	234	.....	.....
77,179 34	217	8,730 50	230	12,231 86	235	24,934 96	1,454,996 11 21
13 77	.....	.....	242	5,042 06	.....	.....	242,856 73 22
.....	.....	.....	259	7 53	252	13,972 17	13,979 70 23
.....	.....	.....	.....	.....	247	1,577 10	1,577 10 24
.....	.....	.....	.....	.....	.....	155,965 74	25 25
.....	.....	.....	.....	.....	.....	2,000 00	26 26
.....	.....	.....	243	6,090 35	249	11,687 34	17,777 69 27
.....	.....	.....	.....	.....	251	7,331 37	7,331 37 28
.....	.....	.....	.....	.....	250	7,213 37	7,213 37 29
1,529 00	.....	.....	.....	.....	.....	.....	235,713 30 30
.....	.....	.....	.....	.....	.....	.....	223,715 15 31
.....	.....	.....	.....	.....	.....	.....	11,834 18 32
.....	.....	.....	.....	.....	.....	.....	148,653 25 33
18,512 30	229	22,129 07	245	19,522 61	249	6,704 37	66,868 35 34
149,453 84	.....	75,799 49	.....	128,629 85	.....	168,610 71	3,157,545 30

T.A.

.....	.....	.....	.....	262	9,934 20	9,934 20	1
.....	.....	.....	.....	261	.....	.....	.....
78 50	234	5,963 63	253	274	1,186 10	1,186 10	2
.....	.....	.....	.....	261	16,829 26	169,377 85	3
.....	.....	.....	.....	262	5,025 00	5,025 00	4
.....	.....	.....	.....	.....	.....	38,642 88	5
.....	.....	.....	.....	.....	.....	15,649 77	6
.....	.....	254	7,461 61	261	13,243 26	27,755 45	7
.....	.....	254	746 79	262	5,866 08	6,412 87	8
.....	.....	254	2,543 93	262	17,017 90	19,561 83	9
.....	.....	.....	.....	261	7,505 88	32,701 52	10
78 50	.....	5,963 63	.....	.....	76,407 68	326,247 47	.....

(a) Including \$2,050 contributed by Corporation of City of Ottawa.

(b) Including \$2,950 do do also \$330 paid by Militia

Department.

EXPENDITURE on PUBLIC BUILDINGS

CONSTRUCTION

NORTH-WEST

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$
			\$ cts.		
1	Battleford Buildings.....	Saskatchewan Territory..	63,412 12	237	68,09
2	Fort Pelly Barracks.....	.....	63,287 85	.....	.....
3	Buildings at Forts McLeod, Walsh, Calgary, Saskatchewan, Tail Creek, Qu'Appelle and Shoal Lake.....	.....	15,000 00	.....	.....
	Totals .....	.....	141,699 97	.....	68,09

BRITISH

1	Nanaimo Post Office.....	Vancouver.....	.....	.....	.....
2	New Westminster Penitentiary.....	New Westminster.....	127,041 60	228	23,00
3	do Post Office.....	do .....	.....	.....	.....
4	Victoria Custom House, Post Office, &c.....	Victoria City.....	64,344 94	.....	.....
5	do Marine Hospital.....	do	18,635 43	.....	.....
	Totals.....	210,021 97	23,00

PUBLIC BUILDINGS

1	Public Buildings Generally.....	39,928 16	227 230	8,8
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ABSTRACT STATEMENT of Expenditure

1	Nova Scotia.....	154,267 13	6
2	Prince Edward Island.....	73,385 62
3	New Brunswick.....	.....	383,316 54	.....	98,0
4	Quebec.....	.....	1,314,065 90	.....	62,6
5	Ontario.....	.....	2,378,079 87	.....	256,9
6	Manitoba.....	.....	222,730 61	.....	.....
7	North-West Territories.....	.....	141,699 97	.....	68,0
8	British Columbia.....	.....	210,021 97	.....	23,0
9	Generally.....	.....	39,928 16	.....	8,8
	Totals.....	.....	4,917,495 77	.....	518,9

the undermentioned years—*Continued.*

N—*Concluded.*

TERITORIES.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.	1880.		1881.		1882.				
\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.		
.....	232	3,737 92	255	11,578 16	263	3,025 91	149,847 55	1	
.....	.....	.....	.....	.....	.....	.....	63,287 85	2	
.....	.....	.....	.....	.....	.....	.....	15,000 00	3	
.....	.....	3,737 92	.....	11,578 16	.....	3,025 91	228,135 40		

UMBIA.

.....	.....	.....	.....	263	25 33	25 33	1	
.....	234	128 00	255	5,678 90	263	6,781 17	162,635 14	2
.....	.....	.....	.....	263	848 57	848 57	3	
.....	.....	.....	255	9,553 87	263	4,430 70	78,329 51	4
.....	.....	.....	.....	.....	.....	.....	18,635 43	5
.....	128 00	15,232 77	12,085 77	260,473 98	

ERALLY.

13,474 44	234	12,430 02	255	14,966 15	263	14,947 57	104,633 33	1	
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UBLIC BUILDINGS—Construction.

77 31	3,648 16	3,604 87	1,849 82	164,110 00	1	
.....	1,800 00	68 06	75,253 68	2	
186,785 58	.....	266,261 11	.....	194,143 51	.....	119,516 09	1,248,672 00	3	
24,240 09	.....	77,375 93	.....	121,859 95	.....	147,521 12	1,747,702 46	4	
149,453 84	.....	75,799 49	.....	128,629 85	.....	168,610 71	3,157,545 30	5	
78 50	.....	5,963 63	.....	21,067 05	.....	76,407 68	326,247 47	6	
.....	.....	3,737 92	.....	11,578 16	.....	3,025 91	228,135 40	7	
.....	.....	128 00	.....	15,232 77	.....	12,085 77	260,473 98	8	
13,474 44	.....	12,430 02	.....	14,966 15	.....	14,947 57	104,633 33	9	
374,109 76	.....	445,344 26	.....	512,882 31	.....	544,032 73	7,312,773 62		

EXPENDITURE on PUBLIC BUILDING

RE
NOV

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	II.	\$
1	Halifax Dominion Building.....	Halifax City	44,242	02	232	2,854
2	do Drill Shed.....	do	164	00	232	93
3	do Penitentiary.....	do	308	97	232	50
4	do Quarantine Station, Lawlor's Island.....	do	1,766	20	232	114
5	Lunenburg Marine Hospital.....	Lunenburg.....				
6	Pictou Custom House.....	Pictou.....			232	149
7	do Military Storehouse.....	do				
8	do Quarantine Station.....	do	658	82		
9	Yarmouth Quarantine Station.....	Yarmouth.....	35	00	232	255
	Totals.....		47,175	01		3,517

PRINCE E

1	Charlottetown Dominion Building...	Queen's.....	9,926	88	233	2,454
2	do Drill Shed.....	do			233	406
3	do Marine Hospital.....	do				
4	do Quarantine Station.....	do				
	Totals.....		9,926	88		2,860

N

1	Chatham Custom House.....	Northumberland			233	256
2	do Post Office	do				
3	Fredericton Adjutant's Office.....	York				
4	do Custom House.....	do	612	41		
5	do Magazine.....	do				
6	do Post Office	do				
7	do Public Buildings.....	do				
8	Middle Island Quarantine Station...	Northumberland.....				
9	Newcastle Custom House.....	do	540	00		
10	St. John Barracks.....	St. John City.....	396	78		
11	do Custom House (old).....	do	27,767	60	233	500
12	do do (new).....	do				
13	do Fort Dufferin, Negro Point.	do				
14	do Penitentiary.....	do	522	18	233	62
15	do Post Office (old).....	do	800	00	233	147
16	do do (new).....	do				
17	do Public Buildings.....	do				
18	do Public Works Offices	do				
19	do Quarantine Station, Part- rigde Island.....	do	28	00	233	418
20	do Savings Bank (old).....	do	417	82		
21	do do (new).....	do				
22	Westcoast Marine Hospital.....	Westmorland	1,797	44		
	Totals.....		32,882	23		1,384

for the undermentioned years—*Continued.*

IRS.

TOTA.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
\$	cts.	II.	\$	cts.	II.	\$	cts.	\$	cts.
5	930 30	239	7 50	263	537 20	256 273	5,869 47	54,441 29	1
..	.....	.....	.....	263	410 50	273	2,260 67	2,517 88	2
..	.....	.....	.....	.....	.....	273	990 12	1,760 56	3
..	.....	239	146 82	263	463 86	273	50 00	2,510 92	4
..	.....	.....	.....	.....	.....	273	116 00	116 00	5
55	20 65	239	193 23	263	1,075 22	273	905 19	2,343 77	6
55	128 00	.....	.....	.....	.....	.....	.....	128 00	7
..	.....	.....	.....	.....	.....	.....	.....	658 82	8
..	.....	.....	.....	263	20 00	.....	.....	310 07	9
..	1,078 95	.....	347 55	.....	2,506 78	.....	10,191 45	64,817 31	

RD ISLAND.

274 89	239	799 16	263	1,424 47	260 273	4,240 82	19,121 02	1	
.....	.....	.....	.....	.....	273	26 25	432 25	2	
.....	239	252 28	.....	.....	.....	.....	252 28	3	
74 00	.....	.....	.....	.....	.....	.....	74 00	4	
348 89	.....	1,051 44	.....	1,424 47	.....	4,267 07	19,879 55		

UNSWICK.

50 00	239	9 20	263	528 63	273	307 34	1,151 76	1	
837 80	.....	.....	.....	.....	.....	.....	837 80	2	
.....	339	75 00	.....	.....	.....	.....	75 00	3	
.....	.....	.....	.....	.....	.....	.....	612 41	4	
.....	.....	.....	263	133 79	.....	.....	133 79	5	
.....	.....	.....	.....	.....	273	199 98	199 98	6	
.....	239	438 74	.....	.....	.....	.....	438 74	7	
.....	239	32 20	.....	.....	.....	.....	32 20	8	
.....	239	4 20	.....	.....	.....	.....	544 20	9	
.....	.....	.....	.....	.....	.....	.....	396 78	10	
.....	.....	.....	.....	.....	.....	.....	28,267 60	11	
500 00	.....	.....	.....	.....	273	942 15	1,442 15	12	
.....	.....	.....	.....	.....	294	48 38	48 38	13	
52 29	.....	.....	263	1,321 16	272	1,500 47	3,458 10	14	
627 03	.....	.....	263	30 25	.....	.....	1,605 08	15	
.....	.....	.....	.....	.....	273	1,839 14	1,839 14	16	
.....	239	1,259 48	.....	.....	272	78 60	1,338 08	17	
592 68	.....	.....	.....	.....	.....	.....	592 68	18	
.....	.....	.....	.....	.....	273	180 00	626 95	19	
.....	.....	.....	.....	.....	.....	.....	417 82	20	
.....	.....	.....	.....	.....	272	969 82	969 82	21	
.....	.....	.....	.....	.....	.....	.....	1,797 44	22	
2,659 80	.....	1,818 82	.....	2,013 83	.....	6,065 88	46,825 90		

EXPENDITURE on PUBLIC BUILDINGS

REPAIRS

QUE

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
			\$ cts.		\$ cts.
1	Argenteuil Court House	Argenteuil	600 00		
2	Beauport Rifle Range	Quebec			
3	Court House and Jails	do	30 00		
4	Dundee Custom House	Huntingdon	310 00		
5	Grosse Isle Quarantine Station	Montmagny	1,860 13	232	5,387 47
6	Industrie Court House and Jail	Joliette	900 44		
7	Ileaux Noix Fort Lennox Barracks, &c	St. John	8 00		
8	Kamouraska Jail	Kamouraska	83 67		
9	Laprairie Barracks	Laprairie		233	250 00
10	Lévis Fortifications	Lévis	8,689 69	225	2,577 31
11	Montreal Court House	City of Montreal	198 00		
12	do Custom House (old). See In- land Revenue Office	do			
13	do Custom House (new) do	do	28,560 52	232	2,046 26
14	do Examining Warehouse	do			
15	do Geological Museum	do	3,410 66		
16	do Governor General's Office	do	80 00		
17	do do Secretary's Office	do	7 55		
18	do Government House (old)	do	216 13		
19	do Immigrant Sheds	do			
20	do Inland Revenue Office (for- merly old Custom House)	do	8,085 96	233	310 00
21	do Lunatic Asylum	do	71 61		
22	do Military Cemetery	do			
23	do Post Office (old)	do	675 83		
24	do do (new)	do			
25	do Public Buildings	do			
26	Quebec Artillery Barracks	City of Quebec			
27	do Bonner's property	do	174 32		
28	do Citadel Buildings	do	27,757 00	233	1,436 91
29	do Culler's Office	do	2,204 61		
30	do Custom House (old) now Im- migration Office	do	1,509 89		
31	do Custom House (new)	do	12,896 00	233	4,906 01
32	do District Military Storehouse	do			
33	do Drill Shed	do			
34	do Durham Terrace	do	349 20		
35	do Fortifications	do	29,002 18	225	18,494 44
36	do Governor General's Office	do	305 00		
37	do Gunnery School	do		233	577 50
38	do Inspector of Gas Offices	do	1,173 49		
39	do Jail (new)	do	193 66		
40	do Leased Buildings	do	1,963 66		
41	do Marine Hospital	do	6,356 28		
42	do Military Buildings	do			
43	do Observatory	do	725 55	233	317 15
44	do Old Château St. Louis	do	150 00		
45	do Post Office (old)	do	268 04		
46	do do (temporary)	do	1,312 73		
47	do do (new)	do	4,133 77	233	2,927 67
48	do Public Buildings	do	4,422 69	233	303 48
49	do Spencerwood	do	6,959 93		
50	do Weights and Measures Offices	do			
	Carried forward		157,746 18		39,564 20

for the undermentioned years—*Continued.*—*Continued.*

BEC.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	.....	.....	.....	.....	.....	.....	.....	600 00	1
.....	.....	.....	.....	.....	.....	292	893 49	893 49	2
.....	.....	.....	.....	.....	.....	.....	.....	30 00	3
.....	.....	.....	.....	.....	.....	270	87 89	397 89	4
253	11,524 75	239	150 00	.....	.....	.....	.....	18,922 35	5
.....	.....	.....	.....	.....	.....	.....	.....	900 44	6
.....	.....	.....	.....	.....	.....	294	151 75	159 75	7
.....	.....	.....	.....	.....	.....	.....	.....	83 67	8
.....	.....	.....	.....	.....	.....	.....	.....	250 00	9
246	2,002 16	.....	.....	.....	.....	.....	.....	13,269 16	10
.....	.....	.....	.....	.....	.....	.....	.....	198 00	11
.....	.....	.....	.....	.....	.....	.....	.....	.....	12
253	52 35	238	3,014 24	262	5,389 58	271	7,247 76	46,310 71	13
252	9,074 54	238	1,116 19	262	2,214 82	272	1,473 43	13,878 98	14
253	18 77	.....	.....	.....	.....	272	216 40	3,645 83	15
.....	.....	.....	.....	.....	.....	.....	.....	80 00	16
.....	.....	.....	.....	.....	.....	.....	.....	7 55	17
.....	.....	.....	.....	.....	.....	.....	.....	216 13	18
.....	.....	.....	.....	262	75 00	272	575 69	650 69	19
253	69 11	238	106 14	262	3 94	.....	.....	8,605 15	20
.....	.....	.....	.....	.....	.....	.....	.....	71 61	21
.....	.....	.....	.....	.....	.....	272	.....	.....	.....
.....	.....	.....	.....	.....	.....	294	590 50	590 50	22
.....	.....	.....	.....	.....	.....	.....	.....	675 82	23
253	1,604 19	239	352 80	262	3,100 50	271	2,474 92	7,532 41	24
.....	.....	239	23 00	262	38 75	.....	.....	61 75	25
.....	.....	.....	.....	.....	.....	271	99 74	99 74	26
.....	.....	.....	.....	.....	.....	.....	.....	174 32	27
253	9,842 89	238	13,825 46	261	7,145 01	271	2,521 35	62,528 62	28
.....	.....	.....	.....	.....	.....	.....	.....	2,204 61	29
.....
.....	.....	.....	.....	.....	.....	.....	.....	1,509 89	30
253	628 47	238	306 10	261	698 25	270	609 55	20,044 38	31
246	110 80	.....	.....	.....	.....	.....	.....	110 80	32
.....	.....	.....	.....	261	32 00	.....	.....	32 00	33
.....	.....	.....	.....	.....	.....	.....	.....	349 20	34
246	49,734 75	.....	.....	.....	.....	.....	.....	97,231 37	35
.....	.....	.....	.....	.....	.....	.....	.....	305 00	36
.....	.....	.....	.....	.....	.....	.....	.....	577 50	37
.....	.....	.....	.....	.....	.....	.....	.....	1,173 49	38
.....	.....	.....	.....	.....	.....	.....	.....	193 66	39
.....	.....	.....	.....	.....	.....	.....	.....	1,963 66	40
.....	.....	238	992 20	261	163 00	271	4,722 32	12,233 80	41
.....	.....	.....	.....	261	901 00	271	846 50	1,747 50	42
.....	.....	.....	.....	.....	.....	.....	.....	1,042 70	43
.....	.....	.....	.....	.....	.....	.....	.....	150 00	44
.....	.....	.....	.....	.....	.....	.....	.....	368 04	45
.....	.....	.....	.....	.....	.....	.....	.....	1,312 73	46
253	354 50	238	444 94	261	4,767 92	270	1,357 20	13,986 00	47
.....	.....	.....	.....	261	336 00	.....	.....	5,062 17	48
.....	.....	.....	.....	.....	.....	.....	.....	6,959 93	49
.....	.....	.....	.....	261	316 30	.....	.....	316 30	50
.....	85,017 28	.....	20,331 07	.....	25,182 07	.....	28,868 49	349,709 29	

EXPENDITURE on PUBLIC BUILDINGS

REPAIRS

QUEBEC

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$	cts.
	Brought forward.....		155,746 18	II.	39,564 20
51	Sherbrooke Immigrant Shed.....	Sherbrooke			
52	Sorel Court House and Jail.....	Richelieu	920 64		
53	St. H��len's Island Magazine.....	City of Montreal	282 00		
54	St. John's Post Office.....	St. John			
55	St. R��gis Custom House.....	Huntingdon	89 90		
56	Three Rivers Custom House.....	City of Three Rivers	581 88	233	476 05
57	do Old Barracks.....	do	76 95		
	Totals.....		157,697 55		40,040 25

ONTA

1	Belleville Custom House, &c.....	West Hastings			
2	do Inland Revenue Office.....	do			
3	Brantford Post Office, &c.....	South Brant			
4	Chatham Custom House.....	Kent			
5	Guelph Custom House, &c.....	South Wellington			
6	Hamilton Custom House.....	City of Hamilton	3,568 66	231	208 89
7	do Post Office.....	do	1,109 74	231	1,363 81
8	Kingston Custom House.....	City of Kingston	5,837 61	231	256 44
9	do Fortifications and Military Buildings.....	do		231	20,694 61
10	do Immigrant Shed.....	do	248 22	231	45 31
11	do Penitentiary.....	do	12,696 27	231	4,778 52
12	do Post Office.....	do	3,977 09	231	89 34
13	do Public Buildings.....	do			
14	do Rockwood Asylum.....	do	23 90		
15	London Custom House.....	City of London	1,112 25	231	4,061 26
16	do Drill Shed.....	do	600 00		
17	do Immigrant Shed.....	do			
18	do Post Office.....	do	3,086 78	231	47 00
19	do Public Buildings.....	do			
20	Niagara Military Buildings.....	Lincoln and Niagara			
21	Ottawa Drill Shed.....	City of Ottawa			
22	do Geological Museum.....	do			
23	do Major's Hill.....	do	534 67		
24	do Parl. & Dept'l Buildings.....	do	582,550 45	229	90,710 05
25	do do Damage by fire.....	do			
26	do do do.....	do	36,323 20	235	20,519 00
27	do do Grounds.....	do			
28	do do Heating.....	do	332,601 33	234	35,006 00
29	do do Remo'l of Snow.....	do	8,582 27	234	469 00
30	do do Telephonic Ser-vice.....	do			
31	do do Ventilation (Improvem't).....	do	11,820 23		
	Carried forward.....		1,004,672 67		178,249 30

for the undermentioned years—Continued.

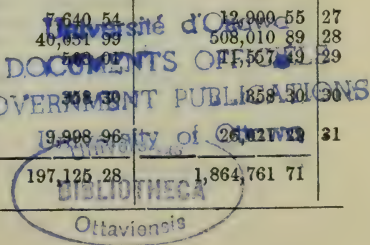
—Continued.

Concluded.

Year ended 30th June.								Total for 15 Years to 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	85,017 28	.....	20,331 07	.....	25,182 07	.....	23,868 49	349,709 29	
.....		.....		.....		272	400 00	400 00	51
.....		.....		.....				920 64	52
.....		.....		262	110 50	.....		392 50	53
.....		.....		.....		272	76 00	76 00	54
.....		.....		.....		272	75 00	164 90	55
.....		239	1 90	262	225 99	.....		1,285 82	56
.....		239	281 95	.....		.....		358 90	57
.....	85,017 28	.....	20,614 92	.....	25,518 56	.....	24,419 49	352,308 05	

RIO.

.....		.....		.....	270	211 00	211 00	1
.....		.....		.....	270	118 85	118 85	2
.....		.....		260	375 50	270	1,399 72	3
.....		.....		.....		270	3 78	4
.....		237	6 50	260	298 68	270	333 95	5
.....		237	7 00	260	747 32	270	569 50	6
254	98 62	237	175 57	260	635 26	270	205 56	7
254	32 91	237	4 95	260	292 34	269	162 30	8
.....		.....		.....		248		
245	20,369 79	.....		.....		294	9,919 78	9
245	22 01	237	3 50	.....		.....	319 04	10
.....		.....		.....		.....	17,474 79	11
254	98 21	237	500 50	260	657 68	269	533 66	12
.....		.....		260	122 20	.....	122 20	13
.....		.....		.....		.....	23 90	14
254	72 81	237	262 89	260	449 15	269	1,379 74	15
.....		.....		.....		.....	7,338 10	16
254	96 85	.....		.....		.....	600 00	17
254	150 30	237	7 00	260	1,612 80	270	75 00	18
254	49 00	.....		260	913 20	276	317 34	19
.....		.....		259	1,727 28	.....	49 00	20
.....		237	56 20	.....		269	637 25	21
.....		.....		.....		268	5,778 77	22
251	106,643 62	235	103,064 52	259	71,478 07	.....	534 67	23
256	11,259 00	249	10,974 41	.....		267	97,428 58	24
.....		241	21,849 00	256	17,763 00	.....	10,974 41	25
.....		.....		256	5,260 01	264	19,517 70	26
255	35,102 47	240	29,230 78	257	36,038 25	264	7,640 54	27
251	959 81	240	595 29	256	448 11	265	46,651 93	28
.....		.....		.....		264	500 00	29
.....		.....		.....		265	344 40	30
.....		247	4,202 10	.....		250	19,998 96	31
.....	174,955 40	.....	170,940 21	.....	138,818 85	.....	197,125 28	
.....		.....		.....		.....	1,864,761 71	



EXPENDITURE on PUBLIC BUILDINGS

REPAIRS

ONTARIO—

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	
			\$ cts.		\$ cts.
	Brought forward.....		1,004,672 67	.....	178,249 30
32	Ottawa Post Office (old).....	City of Ottawa	767 33	.....	.....
33	do do (new).....	do .....	.....	.....	.....
34	do Public Buildings, Post Office, Rideau Hall, &c.....	do	4,500 00	230	6,750 00
35	do Supreme Court (rent of rooms).....	do	500 00	.....	.....
36	do do (formerly work-shops).....	do .....	.....	.....	.....
37	Port Colborne Custom House.....	Welland.....	.....	.....	.....
38	Port Robinson's Inland Rev. Offices.....	do .....	.....	.....	.....
39	Prescott Wellington Barracks.....	South Grenville.....	.....	231	564 30
40	Rideau Hall.....	Russell.....	250,528 12	230	.....
41	do allowance for Fuel and Light.....	do	20,000 00	234	39,301 46
42	do Removal of Snow.....	do	3,430 30	235	5,000 00
43	St. Catharines Custom House.....	Lincoln.....	.....	234	310 00
44	Toronto Custom House (temporary).....	City of Toronto.....	2,538 98	230	120 00
45	do do (new).....	do .....	.....	231	429 52
46	do Drill Shed.....	do .....	.....	.....	.....
47	do Examining Warehouse.....	do	196 75	.....	.....
48	do Forts (old and new).....	do	2,122 39	231	1,197 80
49	do Government Building.....	do	267 55	.....	.....
50	do Immigrant Sheds.....	do	1,773 43	221	264 33
51	do Inland Revenue Offices.....	do	25,067 23	231	82 35
52	do Military Buildings.....	do .....	.....	.....	.....
53	do do Cemetery.....	do .....	.....	.....	.....
54	do Post Office (old).....	do	1,032 93	.....	.....
55	do do (new).....	do	838 95	.....	.....
56	do Public Buildings.....	do	59 09	.....	.....
57	do Receiver General's Office.....	do .....	.....	.....	.....
58	do Savings Bank.....	do	253 00	.....	.....
59	do Upper Canada Bank Build'g.....	do	364 25	.....	.....
60	Windsor Post Office, &c.....	North Essex.....	.....	.....	.....
	Totals.....		1,318,912 97	.....	232,69 00

MAN

1	Emerson Post Office, &c.....	Provencher .....	.....	.....	.....
2	Stoney Mountain Penitentiary	Lisgar .....	.....	234	604 80
3	Winnipeg Architect's Office	City of Winnipeg.....	.....	.....	.....
4	do Assistant Receiver-General's Office.....	do	1,200 00	.....	.....
5	do Clerk of Works Office.....	do .....	.....	.....	.....
6	do Custom House	do	1,422 16	233	1,037 80
7	do Finance Office.....	do	778 08	.....	.....
8	do Fort Osborne Barracks.....	do	2,756 50	.....	.....
9	do Immigrant Buildings.....	do	41 27	.....	.....
10	do Lieut.-Governor's Residence (rental).....	do	22,125 19	.....	.....
11	do Provost Prison	do	305 18	.....	.....
12	do Public Buildings.....	do .....	.....	.....	.....
	Totals.....		28,628 38	.....	1,642 00

for the undermentioned years—*Continued.*—*Continued.**Concluded.*

Year ended 30th June.				Total for 15 Years ended 30th June, 1882.		Number.
1879.	1880.	1881.	1882.			
II. \$ cts.	II. \$ cts.	II. \$ cts.	II. \$ cts.	\$ cts.		
..... 174,955 40	..... 170,940 21	..... 138,818 85	..... 197,125 28	1,864,761 71		
.....	.....	.....	.....	767 33	32	
251 253 45	237 1,647 39	259 200 00	.....	2,100 84	33	
.....		
251 9,000 00	237 9,000 00	256 9,000 00	264 11,433 25	49,683 25	34	
.....	.....	.....	.....	500 00	35	
.....	.....	.....	268 801 92	801 92	36	
254 10 00	.....	.....	.....	16 00	37	
.....	.....	260 69 53	.....	69 53	38	
254 1,622 75	237 1,393 50	260 446 50	269 399 87	4,426 92	39	
.....		
252 56,490 27	236 61,391 91	257 15,439 50	265 22,254 52	445,405 78	40	
.....		
256 5,000 00	241 8,000 00	256 9,012 10	264 8,000 00	55,012 10	41	
256 486 05	240 560 29	256 473 11	264 425 01	5,684 76	42	
254 5 00	.....	.....	.....	125 00	43	
.....	.....	.....	.....	2,538 98	44	
253 39 38	237 384 27	259 935 53	268 2,597 41	4,386 11	45	
.....	.....	259 124 15	.....	124 15	46	
253 375 28	237 854 32	259 1,434 61	269 9,646 93	12,507 89	47	
254 1,034 95	237 5 00	.....	.....	4,360 14	48	
.....	.....	.....	.....	267 55	49	
254 138 60	237 405 00	259 135 00	268 966 18	3,682 54	50	
254 374 41	237 52 34	.....	269 879 78	26,456 11	51	
.....	.....	.....	250 24 00	24 00	52	
.....	237 5 00	.....	.....	5 00	53	
.....	.....	.....	.....	1,032 93	54	
254 228 04	237 4,366 54	260 974 92	269 2,798 34	9,206 79	55	
254 149 60	237 705 65	259 191 69	268 161 96	1,267 39	56	
.....	.....	.....	268 2 70	2 70	57	
.....	.....	.....	.....	253 00	58	
.....	.....	.....	.....	364 25	59	
.....	.....	.....	270 1,229 74	1,229 74	60	
.....		
..... 250,162 58	..... 259,711 42	..... 177,255 49	..... 258,746 89	2,497,058 41		

FOBA.

.....	240	3,144 99	263 1,090 55	274 79 10	79 10	1
.....	.....	.....	264 292 25	273 153 67	4,994 01	2
.....	.....	.....	.....	273 583 15	875 40	3
.....	.....	.....	.....	.....	1,200 00	4
.....	.....	264 206 00	.....	.....	206 00	5
255 166 00	239 127 00	264 1,182 65	273 1,298 20	.....	5,233 82	6
.....	.....	.....	.....	.....	778 08	7
255 183 00	239 110 00	264 190 00	294 1,474 03	.....	4,713 53	8
.....	.....	.....	.....	.....	59 42	9
.....	
.....	239 8,000 00	263 4,000 00	.....	.....	34,125 19	10
.....	.....	.....	.....	.....	305 18	11
.....	239 579 43	264 45 00	.....	.....	624 43	12
.....	
..... 319 00	..... 11,979 57	..... 7,006 45	..... 3,588 15	.....	53,194 16	

EXPENDITURE on PUBLIC BUILDINGS

REPAIRS

NORTH-WEST

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	II.	\$ cts.
1	Battleford Buildings.....	.....	100	00	.....	.....

BRITISH

1	Kootenay Custom House	Yale .....	.....	234	10	00
2	New Westminster Custom House.....	New Westminster.....	844	50	.....	.....
3	do Government House	do .....	.....	.....	.....	.....
4	do Indian Commissioner's Office....	do .....	.....	234	500	00
5	do Penitentiary	do .....	.....	.....	.....	.....
6	do Post Office.....	do	75	00	.....	.....
7	do Public Buildings.....	do	225	00	234	154 50
8	Victoria Custom House, &c.....	Victoria .....	.....	.....	.....	.....
9	do Marine Hospital	do	24	00	.....	.....
10	do Post Office.....	do	2,138	15	.....	.....
11	do Public Buildings.....	do	2,099	88	.....	.....
12	do Savings Bank	do .....	.....	.....	.....	.....
Totals.....			5,406	53	664 50

PUBLIC BUILDINGS

1	Public Buildings, Generally.....	655	00
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ABSTRACT STATEMENT of Expenditure

1	Nova Scotia.....	47,175	01	3,517	57
2	Prince Edward Island.....	9,926	88	2,860	80
3	New Brunswick.....	.....	32,882	23	.....	1,385	34
4	Quebec.....	.....	157,697	55	.....	40,040	25
5	Ontario.....	.....	1,318,912	97	.....	232,269	06
6	Manitoba.....	.....	28,628	38	.....	1,642	61
7	North-West Territories.....	.....	100	00	.....	.....	.....
8	British Columbia.....	.....	5,406	53	.....	664	50
9	Generally.....	.....	655	00	.....	.....	.....
Totals			1,601,384	55	.....	283,380	13

for the undermentioned years—*Concluded.*

—*Concluded.*

TERRITORIES.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
255	6,118 65	240	590 00	.....	.....	.....	.....	6,808 65	1

COLUMBIA.

.....	.....	.....	.....	.....	.....	.....	.....	10 00	1
.....	.....	.....	.....	264	34 62	.....	.....	879 12	2
255	1,505 78	.....	.....	.....	.....	.....	.....	1,505 78	3
.....	.....	.....	.....	.....	.....	.....	.....	500 00	4
250	3,021 04	.....	.....	.....	.....	274	104 36	3,125 40	5
.....	.....	.....	.....	.....	.....	.....	.....	75 00	6
.....	.....	.....	.....	.....	.....	.....	.....	379 50	7
.....	.....	232	42 00	264	27 82	274	60 00	129 82	8
.....	.....	.....	.....	.....	.....	274	1,163 00	1,187 00	9
.....	.....	.....	.....	264	27 32	274	157 37	2,322 84	10
248	815 50	232	435 85	264	160 00	274	158 00	3,669 23	11
.....	274	267 52	267 52	12
.....	5,342 32	477 85	249 76	1,910 25	14,051 21	

GENERALLY.

.....	240	12 05	667 05	1
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n PUBLIC BUILDINGS—Repairs.

.....	1,078 95	347 55	2,506 78	10,191 45	64,817 31	1
.....	348 89	1,051 44	1,424 47	4,267 07	19,879 65	2
.....	2,659 80	.....	1,818 82	.....	2,013 83	.....	6,065 88	46,825 90	3
.....	85,017 28	.....	20,614 92	.....	25,518 56	.....	24,419 49	353,308 05	4
.....	250,162 58	.....	259,711 42	.....	177,255 49	.....	258,746 89	2,497,058 41	5
.....	349 00	.....	11,979 57	.....	7,006 45	.....	3,588 15	53,194 16	6
.....	6,118 65	.....	590 00	.....	.....	.....	.....	6,808 65	7
.....	6,342 32	.....	477 85	.....	249 76	.....	1,910 25	14,051 21	8
.....	.....	.....	12 05	.....	.....	.....	.....	667 05	9
.....	351,077 47	.....	296,603 62	.....	215,975 34	.....	309,189 18	3,056,610 29	

EXPENDITURE on HARBOURS and BREAK

NOVA

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
1	Annapolis Harbour.....	Annapolis.....			
2	Antigonish.....	Antigonish.....		237	3,649 15
3	Arichat West.....	Richmond.....			
4	Arisaig Pier.....	Antigonish.....	2,283 00		
5	Avonport.....	Kings.....		237	500 00
6	Bayfield Harbour.....	Antigonish.....			
7	Belleveau Cove.....	Digby.....		237	3,000 00
8	Benacadie Pond.....	Cape Breton.....			
9	Big Pond.....	do.....	2,500 00		
10	Big Tracadie.....	Antigonish.....	13,564 37		
11	Broad Cove.....	Lunenburg.....	3,000 00		
12	Burying Island, Canso Harbour.....	Guy'sboro'.....			
13	Canada Creek.....	Kings.....	2,000 00		
14	Canning.....	do.....		237	500 00
15	Cape St. Mary.....	Digby.....			
16	Cheverie.....	Hants.....	2,338 88		
17	Chipman's Brook.....	Kings.....	2,750 00		
18	Church Point.....	Digby.....	2,000 00		
19	Cow Bay.....	Cape Breton.....	90,120 04	238	7,343 87
20	Cranberry Head.....	Yarmouth.....	2,000 00		
21	Delap's Cove.....	Annapolis.....			
22	Digby Pier.....	Digby.....	7,070 00		
23	Gabarus.....	Cape Breton.....	2,000 00		
24	Green Cove.....	Yarmouth.....	2,500 00		
25	Hampton.....	Annapolis.....			
26	Harbourville.....	Kings.....	2,000 00		
27	Harbours Generally.....				
28	Indian Island Beach.....	Cape Breton.....			
29	Ingonish, South.....	Victoria.....	84,397 20	239	51 50
30	Joggins.....	Cumberland.....	10,000 00		
31	Jordan Bay.....	Shelburne.....	22,568 79	237	2,000 00
32	L'Ardoise.....	Richmond.....	10,325 50		
33	Lingan.....	Cape Breton.....	2,000 00		
34	Little Harbour.....	Lunenburg.....			
35	Liverpool, Brooklyn.....	Queen's.....	58,320 77		
36	Mabou Harbour.....	Inverness.....	83,440 15	239	1,524 42
37	Main à Dieu Breakwater.....	Cape Breton.....			
38	Maitland Pier.....	Hants.....	6,341 99		
39	Margaree Pier.....	Inverness.....	3,000 00		
40	Margaretville Pier.....	Annapolis.....	8,650 00		
41	Merigomish Pier.....	Pictou.....			
42	Meteghan Cove Breakwater.....	Digby.....	10,000 00	237	3,000 00
43	do River do.....	do.....	4,500 00		
44	Morden Pier.....	Kings.....	3,000 00	240	1,500 00
45	Musquodoboit Pier.....	Halifax.....	1,000 00		
46	McNair's Cove.....	Antigonish.....	28,564 45	237	4,550 50
	Carried forward.....		472,235 14		27,619 50

WATERS for the undermentioned years—*Continued.*

SCOTIA.

Year ended 30th June.								Total for 15 Years to 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts	
				270	750 00			750 00	1
								3,649 15	2
		243							
260	5,348 29	245	4,346 00					9,694 29	3
261	100 00			271	200 00			2,583 00	4
								500 00	5
259									
264	4,825 28	243	63 00					4,888 28	6
								3,000 00	7
						283	716 20	716 20	8
								2,500 00	9
								13,564 37	10
								3,000 00	11
				270	5,000 00	284	4,000 00	9,000 00	12
259	3,000 00							5,000 00	13
								500 00	14
						284	2,000 00	2,000 00	15
								2,338 88	16
								2,750 00	17
								2,000 00	18
				270					
259	999 74	243	5,125 00	273	17,855 45	283	6,000 00	127,444 10	19
261	1,000 08	245	499 95					3,500 03	20
260									
261	2,150 00							2,150 00	21
		243							
261	29 61	245	2,338 12	273	188 57	288	700 00	10,326 30	22
				270					
				273	1,175 00			3,175 00	23
261	2,000 00							4,500 00	24
260	3,000 00					283	1,572 37	4,572 37	25
								2,000 00	26
				273	4,154 57	288	753 64	4,908 21	27
				270	1,096 45	283	1,100 00	2,196 45	28
				273					
261	60 00	245	87 00	274	608 00	283	1,500 00	86,703 70	29
								10,000 00	30
261	177 33							24,746 12	31
261	4 50							10,330 00	32
		243	1,978 14					3,978 14	33
						292	200 00	200 00	34
261	300 11			273	263 84	283	8,927 76	67,812 48	35
						283	4,126 00	89,090 57	36
				271	66 10	284	8,530 12	8,596 22	37
								6,341 99	38
260	3,000 00							6,000 00	39
261	500 00							9,150 00	40
								1,065 60	41
				271	1,065 60				
				271	37 79	284	2,165 00	15,202 79	42
						282	2,000 00	6,500 00	43
259	1,000 00							5,500 06	44
264	831 10							1,831 10	45
264	12 50							33,127 45	46
	28,338 54		14,437 21		32,461 37		44,291 09	619,382 85	

EXPENDITURE on HARBOURS and BREAK

NOVA SCOTIA

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
			\$ cts.	II.	\$ cts.
	Brought forward.....		472,235 14	.....	27,619 50
47	North Sydney.....	Cape Breton			
48	Oak Point (known as Kingsport).....	Kings	24,045 70		
49	Oyster Pond, Chedabucto Bay.....	Guysboro'	2,000 00		
50	Parrsboro' or Partridge Island Pier.....	Cumberland		237	975 42
51	Petit de Grat Inlet.....	Richmond			
52	Pictou Island.....	Pictou			
53	Plympton	Digby.....	3,543 97		
54	Porper's Pond.....	Guysboro'	5,119 09		
55	Port George.....	Annapolis	7,000 00		
56	do Greville.....	Cumberland	6,028 00		
57	do Hood Pier.....	Inverness.....	16,469 81	239	777 53
58	do Medway	Queen's	4,513 50		
59	do Williams (now Port Lorne).....	Annapolis.....	3,500 00		
60	Porter's Lake.....	Halifax			
61	Pudding Pan.....	Queen's			
62	Ragged Pond.....	Guysboro'			
63	Salmon River Breakwater	Digby	2,656 03		
64	Saulnierville.....	do	2,000 00		
65	Scott's Bay.....	King's.....			
66	Somerville.....	Queen's			
67	Tancook Island.....	Lunenburg	2,000 00		
68	Three Fathom Harbour.....	Halifax			
69	Trout Cove.....	Digby	4,000 00		
70	Tusket Island.....	Yarmouth	500 00		
71	Victoria Harbour.....	King's.....		237	1,000 00
72	White Point Harbour.....	Queen's		237	3,500 00
73	Yarmouth do	Yarmouth	13,417 79		
	Totals, Nova Scotia.....		569,029 03	.....	33,872 45

PRINCE ED

1	Campbell's Cove.....	King's.....			
2	Colville Bay (Souris).....	do	39,879 33	238	28,759 38
3	Harbours Generally			240	
4	Malpeque.....	Prince		238	9,281 80
5	Miminigash ..	do			
6	New London.....	Queen's.....	4,814 10		
7	Rustico.....	do			
8	St. Peter's Bay.....	King's.....		238	1,754 30
9	Tignish	Prince.....	11,318 10	239	320 09
10	Wood Islands.....	Queen's			
	Totals, Prince Edward Island		56,011 53	.....	40,115 57

WATERS for the undermentioned years—Continued.

Concluded.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
I.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	28,338 54	.....	14,437 21	.....	32,461 37	.....	44,291 09	619,382 85	
.....	.....	.....	.....	.....	.....	281	2,000 00	2,000 00	47
61	530 00	.....	.....	273	1 50	.....	.....	24,577 20	48
61	250 01	.....	.....	.....	.....	.....	.....	2,250 01	49
61	194 73	244	195 79	.....	.....	288	49 00	1,414 94	50
.....	.....	244	992 70	271	1,007 30	284	1,000 00	3,000 00	51
.....	.....	.....	.....	270	745 49	.....	.....	745 49	52
.....	.....	.....	.....	.....	.....	.....	.....	3,543 97	53
.....	.....	.....	.....	.....	.....	.....	.....	5,119 09	54
.....	.....	.....	.....	.....	.....	.....	.....	7,000 00	55
.....	.....	.....	.....	.....	.....	.....	.....	6,028 00	56
61	149 73	.....	.....	271	3,000 00	288	1,000 00	21,397 07	57
.....	.....	245	214 73	.....	.....	.....	.....	4,728 23	58
61	745 76	.....	.....	.....	.....	.....	.....	4,245 76	59
.....	.....	.....	.....	.....	.....	288	200 00	200 00	60
59	5,714 75	.....	.....	.....	.....	.....	.....	5,714 75	61
59	2,000 00	243	1,991 43	.....	.....	283	500 00	4,491 43	62
.....	.....	.....	.....	.....	.....	.....	.....	2,656 03	63
.....	.....	.....	.....	.....	.....	.....	.....	2,000 00	64
59	3,000 00	.....	.....	.....	.....	.....	.....	3,000 00	65
50	4,990 25	.....	.....	.....	.....	.....	.....	4,990 25	66
.....	.....	.....	.....	.....	.....	.....	.....	2,000 00	67
50	2,999 94	.....	.....	.....	.....	.....	.....	2,999 94	68
.....	.....	243	999 76	.....	.....	288	500 00	5,499 76	69
54	500 64	.....	.....	.....	.....	.....	.....	1,000 64	70
.....	.....	.....	.....	.....	.....	.....	.....	1,000 00	71
51	500 00	.....	.....	.....	.....	.....	.....	4,000 00	72
51	500 00	.....	.....	.....	.....	288	1,700 00	15,617 79	73
.....	50,414 35	.....	18,831 62	.....	37,215 66	.....	51,240 09	760,603 20	

ARD ISLAND.

.....	.....	245	130 22	.....	.....	287	7,291 20	7,421 42	1
61	8,162 95	244	9,432 67	271	12,948 39	287	1,254 09	100,436 81	2
62	4,197 44	245	356 29	273	2,444 68	288	376 82	2,821 50	3
62	3,936 80	245	31 00	272	1,400 00	288	43 00	15,278 53	4
.....	.....	.....	.....	272	998 77	286	1,500 00	6,466 57	5
.....	.....	244	.....	.....	.....	.....	.....	.....	.....
62	1,472 03	245	1,998 19	273	57 10	288	500 00	8,841 42	6
.....	.....	.....	.....	.....	.....	286	4,549 60	4,549 60	7
62	2,135 40	.....	.....	272	2,195 35	287	302 79	6,387 84	8
61	.....	.....	.....	.....	.....	.....	.....	.....	.....
64	237 09	245	555 02	272	2,997 03	287	4,327 20	19,754 53	9
.....	.....	244	.....	.....	.....	.....	.....	.....	.....
62	1,370 20	245	1,963 00	272	35 21	287	1,956 52	5,324 93	10
.....	21,511 91	.....	14,466 39	.....	23,076 53	.....	22,101 22	177,283 15	

EXPENDITURE on HARBOURS and BREAK

NEW

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	
			\$ cts.		\$ cts.
1	Bathurst.....	Gloucester.....	3,876 43	.....	.....
2	Black River Pier.	St. John.....	.....	.....	.....
3	Campo Bello (Wilson's Beach).....	Charlotte.....	1,600 00	237	1,000 00
4	Clifton	Gloucester.....	.....	236	4,565 75
5	Cocagne	Kent .....	.....	.....	.....
6	Dipper Harbour.....	St. John	22,239 72	.....	.....
7	Grande Anse, Baie des Chaleurs.....	Gloucester.....	3,998 98	236	1,000 00
8	Grand Manan.....	Charlotte .....	.....	.....	.....
9	Harbours Generally.....	.....	.....	.....	.....
10	Herring Cove.....	Albert	13,113 45	.....	.....
11	Hillsboro'	do	3,000 00	.....	.....
12	Miramichi tug service.....	Northumberland	4,000 00	.....	.....
13	Pointe du Chêne (Shediac)	Westmoreland	14,583 24	.....	.....
14	Quaco, Bay of Fundy.....	St. John.....	18,877 84	.....	.....
15	Richibucto	Kent	35,493 81	.....	.....
16	do tug service.....	do	13,000 00	.....	.....
17	Rocher Bay	Albert.....	.....	.....	.....
18	Sackville.....	Westmoreland	900 00	.....	.....
19	Shippegan.....	Gloucester.....	15,461 93	236	1,042 00
20	St. Andrews.....	Charlotte .....	.....	.....	.....
21	St. John Harbour.....	St. John.....	145,869 36	236	80,155 05
22	Tynemouth.....	do	2,500 00	.....	.....
Totals, New Brunswick			298,517 76	.....	87,762 80

QU

1	Amherst Harbour, Magdalen Islands	Gaspé.....	14,283 21	.....	.....
2	Anse du Portage Slip and Wharf....	Saguenay .....	.....	.....	.....
3	Anse St. Jean Pier.....	Chicoutimi.....	.....	.....	.....
4	Bagotville Pier, River Saguenay.....	do	3,084 34	.....	.....
5	Baie St. Paul Pier.....	Charlevoix.....	25,621 03	.....	.....
6	Beauharnois, River St. Lawrence.	Beauharnois .....	.....	.....	.....
7	Belœil Piers and Booms.....	Montmagny .....	.....	.....	.....
8	Berthier (<i>en bas</i>) Pier	do	4,372 17	236	4,106 68
9	Cap à l'Aigle Pier.....	Charlevoix.....	.....	.....	.....
10	Carleton do	Bonaventure .....	.....	.....	.....
11	Cedars do	Soulanges.....	.....	.....	.....
12	Chenal du Moine Pier.....	Yamaska.....	.....	.....	.....
13	Chicoutimi Pier, River Saguenay.....	Chicoutimi.....	10,041 75	.....	.....
14	Côteau Landing Pier.....	Soulanges.....	11,453 88	.....	.....
15	Eboulements Pier.....	Charlevoix.....	13,207 57	.....	.....
16	Etang du Nord Pier.....	Gaspé.....	.....	.....	.....
17	Grenville Harbour.....	Argenteuil.....	.....	.....	.....
Carried forward.....			82,063 95	.....	4,106 68

WATERS for the undermentioned years—*Continued.*

BRUNSWICK.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
258	3,907 40							3,876 43	1
								3,907 40	2
						286	207 11	2,807 11	3
259	4,916 00					288	200 00	9,681 75	4
						286	941 76	941 76	5
		245	4 80					22,244 52	6
258	1,961 41			273	195 89			7,156 28	7
		245	5 40					5 40	8
				273	1,393 78	288	376 82	1,770 60	9
								13,113 45	10
								3,000 00	11
								4,000 00	12
261		243							
264	2,558 85	245	4,084 68	269	273 21	285	11,072 69	32,572 67	13
						285	1,968 68	20,816 52	14
		243	753 41	270	1,200 00	286	1,000 00	38,447 22	15
								13,000 00	16
		242							
259	1,260 00	245	1,860 00	273	10 00			3,130 00	17
261	400 00			269	750 00			2,050 00	18
258	627 75			269	2,000 00	285	2,950 29	22,084 97	19
						285	72 52	72 52	20
258									
261		242							
264	16,687 99	244	5,916 26	269	2,222 78	285	5,299 55	256,150 99	21
								2,500 00	22
	32,319 40		12,624 55		8,045 66		24,089 42	463,359 59	

BEC.

.....	.....	.....	.....	.....	.....	.....	.....	14,283 21	1
.....	.....	.....	.....	.....	.....	282	584 43	584 43	2
.....	.....	.....	.....	.....	.....	279	.....	.....	.....
.....	.....	242	2,160 84	268	1,500 07	302	1,091 72	4,752 63	3
.....	.....	.....	.....	269	.....	.....	.....	.....	.....
.....	.....	.....	.....	285	3,897 70	282	2,204 59	9,186 63	4
.....	.....	242	606 00	269	13 00	281	4,742 70	30,982 73	5
.....	.....	246	4,515 83	275	870 55	290	1,386 58	6,772 96	6
.....	.....	.....	.....	269	.....	302	.....	.....	.....
.....	.....	256	55 00	285	134 05	303	205 71	394 76	7
257	452 66	242	92 63	.....	.....	.....	.....	9,024 15	8
.....	.....	.....	.....	267	1,653 25	279	1,293 00	2,946 25	9
.....	.....	.....	.....	.....	.....	278	.....	.....	.....
.....	.....	.....	.....	267	1,137 91	282	3,527 40	4,665 31	10
.....	.....	.....	.....	285	1,049 39	302	2,711 62	3,761 01	11
.....	.....	.....	.....	276	1,927 97	292	30 00	1,957 97	12
.....	.....	.....	.....	.....	.....	282	.....	.....	.....
258	4,151 65	.....	.....	269	1,999 91	302	824 30	17,017 61	13
.....	.....	.....	.....	.....	.....	282	8 00	11,461 88	14
.....	.....	252	.....	269	.....	.....	.....	.....	.....
.....	.....	356	941 09	285	1,028 68	302	272 97	15,450 31	15
.....	.....	.....	.....	268	1,165 11	279	11,747 52	12,912 63	16
.....	.....	247	5 40	.....	.....	.....	.....	5 40	17
.....	4,604 31	.....	8,376 79	.....	16,377 59	.....	30,630 54	146,159 87	.....

EXPENDITURE on HARBOURS and BREAKWATERS

QUEBEC

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$ cts.	\$ cts.
	Brought forward		82,063 95	.....	4,106 69
18	Grosse Isle Harbour.....	Montmagny.....	.....	
19	Harbours Generally.....		.....	
20	House Harbour.....	Gaspé (Magdalen Islands)	2,291 60	.....
21	Isle aux Coudres Pier.....	Charlevoix.....	.....	
22	Isle aux Grues do	Montmagny.....	.....	
23	Laprairie, River St. Lawrence.....	Laprairie.....	.....	
24	Les Ecureuils Pier.....	Portneuf.....	.....	
25	L'Islet Pier.....	L'Islet.....	6,412 04	225	12,733 21
26	Malbaie do	Charlevoix.....	16,143 34	.....
27	Matane do	Rimouski.....	.....	
28	Montreal Harbour.....	City of Montreal.....	.....	
29	Mooring Piers, Lachine Rapids.....		860 95	.....
30	New Carlisle Pier.....	Bonaventure.....	.....	
31	Nicolet River (Harbour of Refuge)...	Nicolet.....	.....	
32	Percé Breakwater (Examination and Survey).....	Gaspé.....	.....	
33	Piers below Quebec Generally.....		3,829 91	245	1,507 00
34	Pointe St. Laurent Pier	Montmorency.....	.....	
35	Quebec Harbour (Survey River St. Charles).....	City of Quebec.....	6,458 02	.....
36	do	do .....	.....	
37	Rimouski Pier.....	Rimouski.....	2,616 00	.....
38	Rivière Blanche Pier.....	do	1,953 81	.....
39	do du Loup do	Témiscouata.....	1,861 86	.....
40	do Ouelle do	Kamouraska.....	4,622 78	.....
41	Ste. Anne's Wharf, River Saguenay.	Chicoutimi.....	.....	
42	St. Dominique Pier.....	Soulanges.....	.....	
43	Ste. Famille do	Montmorency.....	.....	
44	St. Jean Pier, Isle d'Orleans.....	do .....	.....	
45	St. Jean Port Joli Pier.....	L'Islet.....	.....	236	2,000 00
46	St. Thomas Pier.....	Montmagny.....	.....	
47	St. Timothée do	Beauharnois.....	.....	
48	St. Zotique do	Soulanges.....	.....	
49	Tadoussac Fish Dams.....	Saguenay.....	.....	
50	Trois Pistoles Pier	Témiscouata.....	.....	
	Totals, Quebec.....		129,114 26	.....	20,346 81

WATERS for the undermentioned years—Continued.

Concluded.

Year ended 30th June.							Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.		
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.
.....	4,604 31	.....	8,378 79	.....	16,377 59	.....	30,630 54	146,159 87
.....	.....	.....	.....	267	6,645 14	278	.....	10,060 33
.....	.....	.....	.....	269	1,319 09	282	3,415 19	2,916 60
.....	.....	.....	.....	.....	.....	282	1,597 51	2,291 60
.....	.....	.....	.....	267	1,683 50	278	2,034 50	3,718 00
.....	.....	.....	.....	.....	.....	280	2,636 18	2,636 18
.....	.....	.....	.....	275	91 70	290	325 73	417 43
.....	.....	.....	.....	.....	.....	280	.....	.....
.....	.....	.....	.....	.....	.....	282	1,571 13	1,571 13
257	6,058 92	242	670 66	285	50 82	.....	.....	25,925 69
.....	.....	242	.....	.....	.....	302	778 77	17,937 04
258	100,00 00	256	1,014 93	.....	.....	282	1,199 00	11,271 43
.....	.....	242	72 43	.....	.....	282	.....	.....
.....	.....	.....	.....	269	146 00	292	601 25	747 25
.....	.....	.....	.....	.....	.....	.....	.....	860 95
.....	.....	.....	.....	.....	.....	278	.....	.....
.....	.....	.....	.....	.....	.....	282	4,220 20	4,220 20
.....	.....	.....	.....	.....	.....	281	594 52	594 52
.....
.....	.....	.....	.....	.....	.....	282	499 43	499 43
.....	.....	242	.....	269	.....	.....	.....	.....
257	1,988 42	256	758 46	285	3,078 04	303	1,696 39	12,858 25
257	708 76	242	100 55	285	456 82	.....	.....	1,266 13
.....
.....	.....	.....	.....	269	46 50	.....	.....	6,458 02
.....	.....	.....	.....	.....	.....	.....	.....	46 50
257	3,140 92	242	7 00	.....	.....	.....	.....	2,616 00
.....	.....	240	.....	269	.....	.....	.....	5,101 73
257	6,535 37	256	2,105 33	285	1,241 63	280	.....	.....
.....	.....	.....	.....	.....	.....	282	4,360 00	16,104 19
.....	.....	.....	.....	.....	.....	279	.....	.....
257	1,557 48	242	713 37	269	2,444 09	282	.....	.....
.....	.....	.....	.....	.....	.....	303	3,510 81	12,848 53
.....	.....	.....	.....	269	.....	282	128 20	128 20
.....	.....	.....	.....	285	1,925 99	308	26 75	1,952 74
.....	.....	242	1,493 41	285	2,830 67	281	4,999 78	9,323 86
.....	.....	.....	.....	285	470 93	.....	.....	470 93
257	1,044 56	242	497 91	269	10 00	282	65 35	3,617 82
.....	.....	.....	.....	267	.....	.....	.....	.....
.....	.....	280	1,513 09	285	3,743 87	.....	.....	5,256 96
.....	.....	.....	.....	.....	.....	282	11 10	11 10
.....	.....	.....	.....	.....	.....	282	.....	.....
.....	.....	.....	.....	.....	.....	292	1,070 75	1,070 75
.....	.....	.....	.....	.....	.....	280	.....	.....
.....	.....	.....	.....	285	582 14	303	3,464 32	4,046 46
.....	.....	.....	.....	.....	.....	279	3,500 00	3,500 00
.....	35,638 74	.....	17,323 93	.....	43,144 52	.....	72,937 40	318,505 82

EXPENDITURE on HARBOURS and BREAKWATERS

ONTARIO

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.		
			\$	cts.	II.	\$	cts.
1	Bayfield, Lake Huron	Huron.....	54,521	98	239	2,045	00
2	Belleville, Lake Ontario.....	Hastings	11,962	60	239	2,000	00
3	Bruce Mines	Algoma					
4	Chantry Island, Lake Huron	Bruce	235,461	29			
5	Cobourg, Lake Ontario	Northumberland	73,036	32	235	8,533	30
6	Collingwood, Georgian Bay.....	Simcoe	57,468	43			
7	Colpoys's Range, Big Bay.....	Bruce	400	00			
8	Consecon.....	Prince Edward.....					
9	Goderich, Lake Huron	Huron.....	467,396	10			
10	Hawkesbury, Ottawa River.....	Prescott.....					
11	Harbours Generally.....						
12	Inverhuron, Lake Huron	Bruce	6,093	60			
13	Kincardine do	do	48,458	64	235	9,421	40
14	Kingston, Lake Ontario	City of Kingston	14,814	40			
15	Little Current, Lake Huron	Algoma					
16	Meaford, Georgian Bay.....	Grey	22,899	19	239	250	00
17	Morpeth.....	Bothwell					
18	Newcastle	Durham			235	5,000	00
19	Oakville, Lake Ontario.....	Halton	588	20			
20	Oshawa do	Ontario	5,000	00			
21	Owen Sound, Georgian Bay	Grey	10,367	55			
22	Penetanguishene.....	Simcoe					
23	Pickering	Ontario					
24	Pictou.....	Prince Edward	6,000	00	239	1,500	00
25	Port Albert, Lake Huron	Huron.....	6,000	00			
26	do Burwell, Lake Erie.....	Elgin	8,595	97	235	1,459	40
27	do Darlington, Lake Ontario.....	Durham	5,000	00			
28	do Dover, Lake Erie	Norfolk.....	2,658	50			
29	do Elgin, Lake Huron.....	Bruce					
30	do Hope, Lake Ontario.....	Durham	25,318	55			
31	do Rowan, Lake Erie.....	Norfolk					
32	do Royal do	do					
33	do Stanley do	Elgin	8,158	00			
34	Portsmouth Harbour	Frontenac					
35	Presqu' Isle, Georgian Bay	Grey	26,950	12			
36	Rondeau, Lake Erie.....	Kent	183,345	80			
37	Saugeen or Southampton.....	Bruce	6,000	00			
38	Shannonville, Lake Ontario	Hastings	2,992	94			
39	Thornbury	Grey					
40	Thunder Bay, Lake Superior.....	Algoma	5,999	25			
41	Tobermory	Bruce			239	6,139	00
42	Toronto, Lake Ontario	York	20,919	05	235		
43	Trenton, Bay of Quinté	Hastings			239	4,139	00
	Totals, Ontario.....		1,316,406	48		38,488	00

(a) Further expenditure included in Pacific Railway.

WATERS for the undermentioned years—*Continued.*

RIO.

Year ended 30th June.								Total for 15 Years to 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
257	4,950 00							61,517 55	
263	2,520 98	246	1,255 03			276	4,949 63	22,688 24	
						290	1,581 33	1,581 33	
264	8 52			264	4,301 06	274	8,291 20	235,469 81	
						277		92,161 89	
257	4,104 81	241	6,506 98	265	7,990 00	278	8,566 10	84,636 32	
				266	500 00			900 00	
						290	3,236 13	3,236 13	
						276			
				274	1,330 00	290	2,805 06	471,531 16	
				275	1,005 67	290	159 23	1,164 90	
				267	4,366 90	278	6,194 43	10,561 33	
								6,093 60	
256									
264	8,803 55	241	1,870 30	265	6,009 25	275	3,486 48	78,049 68	
								14,814 40	
		246	2,415 25	265	4,816 22	275	5,183 78	12,415 25	
		241							
		246	672 33	275	1,882 61	278	10 00	25,714 13	
256	92 60			265	421 80			514 40	
								5,000 00	
								588 20	
								5,000 00	
263	6,589 77	246	1,951 30	265	6,929 98	275	29,942 57	55,781 17	
		246	1,624 25	275	999 82			2,624 07	
257	4,999 00							4,999 00	
263	4,184 60	246	1,335 25			290	468 00	13,487 85	
				266					
				267	2,480 96	275	1,040 35	9,521 31	
								10,055 37	
								5,000 00	
264	2 96							2,661 46	
						276	3,180 97	3,180 97	
						277	5,083 14	30,401 69	
		246	150 00					150 00	
		247	281 83					281 83	
						277	600 00	8,758 00	
						276	3,390 40	3,390 40	
		246	31 22					26,981 34	
						274	(a)		
				265	5,069 96	290	9,475 00	197,890 76	
						276			
						278	2,559 60	8,559 60	
								2,992 94	
						277	3,469 98	3,469 98	
								5,999 25	
						278	349 20	349 20	
256	11,746 88	241	10,315 29	266	7,188 56	275	14,280 49	70,589 95	
263	400 00	246	1,879 48					6,418 54	
	48,403 67		30,288 51		55,292 79		118,303 07	1,607,183 00	

(a) Including \$300 paid by Council of County of Kent.

EXPENDITURE on HARBOURS and BREAKWATERS

MAR

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$ cts.	II. \$ cts.
1	Harbours Generally .....	.....	.....	.....	.....

BRITISH COLUMBIA

1	Harbours Generally .....	.....	.....	II.	.....
2	Victoria, removal of Beaver Rock	223	4,480 00
	Totals	4,480 00

HARBOURS AND BREAKWATERS

1	Harbours generally
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ABSTRACT STATEMENT of Expenditure on HARBOURS and BREAKWATERS

1	Nova Scotia	569,029 03	33,872 40
2	Prince Edward Island .....	.....	56,011 53	.....	40,115 70
3	New Brunswick .....	.....	298,517 76	.....	87,762 80
4	Quebec .....	.....	129,114 26	.....	20,346 50
5	Ontario .....	.....	1,316,406 48	.....	38,488 40
6	Manitoba .....	.....	.....	.....	.....
7	British Columbia .....	.....	.....	.....	4,480 00
8	Generally .....	.....	.....	.....	.....
	Totals .....	.....	2,369,079 06	.....	225,066 20

EXPENDITURE on IMPROVEMENTS

NOV

1	Annapolis River	Annapolis .....	.....	.....	.....
2	East River, Pictou	Pictou	342 73	.....	.....
3	Partridge Island River	Cumberland .....	.....	.....	.....
4	Sissiboo River	Digby	2,500 00	.....	.....
	Totals .....	.....	2,842 73	.....	.....

NEW BRUNSWICK

1	Madawaska River	Victoria .....	.....	II.	.....
2	Miramichi do	Northumberland	2,955 48	.....	.....
3	Petitcodiac do	Albert	12,436 00	.....	.....
4	Richibucto do	Kent .....	.....	.....	.....
5	St. John do	Sunbury	24,985 46	233	2,903 00
6	do do at Oromocto	Victoria .....	.....	.....	.....
7	Tobique do .....	.....	.....	.....	.....
	Totals .....	.....	40,376 94	.....	2,903 00

WATERS for the undermentioned years—*Concluded.*

TOBA.

Year ended 30th June.									Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.				
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.		
.....	288	223 39	223 39	1	

COLUMBIA.

.....	II.	.....	II.	.....	II.	.....	.....	.....	.....
.....	228	179 25	273	72 00	289	642 91	714 91	1	
.....	273	939 61	289	1,785 99	7,384 85	2	
.....	179 25	1,011 61	2,428 90	8,099 76		

GENERALLY.

.....	289	6,083 35	6,083 35	1
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HARBOURS and BREAKWATERS.

.....	50,414 35	18,831 62	37,215 66	51,240 09	760,603 20	1
.....	21,511 91	14,466 39	23,076 53	22,101 22	177,283 15	2
.....	32,319 40	.....	12,624 55	.....	8,045 66	.....	24,089 42	463,359 59	3
.....	35,638 74	.....	17,323 93	.....	43,144 52	.....	72,937 40	318,505 82	4
.....	48,403 67	.....	30,288 51	.....	55,292 79	.....	118,301 07	1,607,183 00	5
.....	.....	.....	.....	.....	.....	.....	223 39	223 39	6
.....	.....	179 25	.....	1,011 61	.....	2,428 90	8,099 76	8,099 76	7
.....	.....	.....	.....	.....	.....	6,083 35	6,083 35	6,083 35	8
.....	188,288 07	.....	93,714 25	.....	167,786 77	.....	297,406 84	3,341,341 26	

RIVERS for the undermentioned Years.

SCOTIA.

.....	II.	.....	II.	.....	II.	.....	.....	.....	.....
.....	243	1,333 77	.....	.....	.....	.....	1,333 77	1	
.....	.....	.....	.....	.....	.....	.....	342 73	2	
.....	.....	.....	291	2,000 00	283	2,500 00	4,500 00	3	
.....	.....	.....	.....	.....	.....	.....	2,500 00	4	
.....	.....	1,333 77	.....	2,000 00	.....	2,500 00	8,676 50		

BRUNSWICK.

II.	.....	II.	.....	II.	.....	II.	.....	.....	.....
.....	.....	.....	.....	.....	.....	286	.....	.....	.....
.....	.....	.....	.....	.....	.....	288	1,037 06	1,037 06	1
.....	.....	.....	.....	.....	.....	.....	.....	2,955 48	2
.....	.....	.....	.....	.....	.....	.....	.....	12,436 00	3
.....	.....	227	998 09	.....	.....	.....	.....	998 09	4
.....	.....	.....	.....	269	.....	285	.....	.....	.....
244	7,229 37	227	4,421 89	273	4,109 14	288	3,655 18	47,304 19	5
.....	.....	227	100 00	.....	.....	288	714 58	814 58	6
.....	.....	.....	.....	273	1,000 00	285	1,000 00	2,000 00	7
.....	7,229 37	.....	5,519 98	.....	5,109 14	.....	6,406 82	67,545 40	

EXPENDITURE on IMPROVEMENTS of RIVER

QU

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	II.	\$ ct.
1	Berthier (<i>en haut</i>).....	Berthier.....				
2	Cap de Chatte.....	Gaspé.....	792	20		
3	Chateauguay.....	Chateauguay.....	3,283	79		
4	Escoumains.....	Saguenay.....				
5	Gatineau.....	Ottawa.....	38,137	82		
6	L'Assomption.....	L'Assomption.....				
7	Ottawa.....		2,559	37		
8	Richelieu.....		34,186	31	239	4,351 1
9	do Maintenance of Buoys.....					
10	Rivière à la Graise, Rigaud.....	Rigaud.....	527	62		
11	do du Lièvre.....	Ottawa.....				
12	do du Loup (<i>en bas</i>).....	Témiscouata.....				
13	do do (<i>en haut</i>).....	Maskinonge.....	2,000	00		
14	do du Nord.....					
15	Saguenay (Channel below Chicoutimi).....	Saguenay & Chicoutimi.....				
16	do (Enlargement La Grande Décharge, Lake St. John).....	do do.....				
17	Salmon, North Shore Ottawa River.....	Ottawa.....				
18	St. Francis.....		14,218	51		
19	St. Lawrence (Removal of Rock Cap à la Roche).....	Champlain and Lotbinière.....	17,000	00		
20	do (Dredging at Contre-cœur).....	Verchères.....	13,752	37		
21	do (Improving Channel between Lake St. Francis and Montreal).....					
22	do (Dredging from Boucherville to Longue Pointe).....	Chamblay and Hochelaga.....				
23	do (Removal of Chains and Anchors).....	Quebec Harbour.....	49,039	52	223	12,000 6
24	do (Maintenance of Buoys).....					
25	St. Placide.....					
26	Yamaska.....					
	Totals.....		175,497	51		16,351 1

ONT

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	II.	\$ ct.
1	Detroit.....		7,260	32		
2	Gananoque.....	Leeds.....				
3	Napanee.....	Lennox.....	17,527	12	239	1,499 6
4	Neebish Rapids, St. Mary's River.....		9,601	92	223	8,000 0
5	Otonabee.....					
6	Ottawa.....		5,368	53		
7	Salmon.....	Hastings.....	825	10		
8	Sydenham.....		8,265	16		
9	Thames.....		(a) 15,156	12		
10	Trent.....					
	Totals.....		64,004	27		9,499 6

or the undermentioned years—*Continued.*
EC.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.		Number.
1879.		1880.		1881.		1882.				
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.		
				268						
				275	4,189 67	282	150 65	4,340 32	1	
								792 20	2	
								3,283 79	3	
				268	1,189 80			1,189 80	4	
						290	1,126 35	39,264 17	5	
		246	2,518 15	275	1,700 36	290	1,496 04	5,714 55	6	
273	300 00	227	4 20			281	299 00	3,162 57	7	
263	3,465 64	227	415 54	275	3,439 41	281	799 20	46,657 22	8	
		227	103 05	285	393 75	303	358 75	855 55	9	
		246	2,465 22	275	1,592 90	290	1,816 02	6,401 76	10	
				276	3,604 98	292	711 91	4,316 89	11	
				275	693 44			693 44	12	
								2,000 00	13	
		247	329 96	265	926 81	290	370 74	1,627 51	14	
						280				
		246	4,599 14	275	3,327 95	290	5,632 85	13,559 94	15	
						280				
				275	746 16	282	6,303 16	6,303 16	16	
								746 16	17	
								14,218 51	18	
								17,000 00	19	
								13,752 37	20	
						274	3,691 30	3,691 30	21	
						290	2,212 50	2,212 50	22	
						279				
244	8,249 16	227	6,601 35	268	7,885 84	292	10,041 11	93,816 98	23	
				269						
		247	990 88	276	268 39	292	318 94	1,578 21	24	
		227	1,719 51					1,719 51	25	
						281	7,008 02	7,008 02	26	
	12,014 80		19,747 00		29,959 46		42,336 54	295,906 43		

10.

I.	II.	II.	II.	II.	II.	II.	II.	II.	II.
.....
.....	.....	.....	.....	275	245 17	.....	.....	7,260 32	1
.....	.....	.....	.....	.....	.....	.....	.....	245 17	2
.....	.....	.....	.....	.....	.....	.....	.....	19,026 80	3
244	.....	.....	.....	.....	.....	.....	.....	.....	.....
263	9,120 62	227	8,949 31	.....	.....	277	500 00	36,171 85	4
.....	.....	.....	.....	264	1,105 86	.....	.....	1,105 86	5
263	300 00	.....	.....	275	296 62	275	4,933 19	10,898 34	6
.....	.....	.....	.....	.....	.....	290	1,088 43	1,913 53	7
.....	.....	.....	.....	.....	.....	.....	.....	8,265 16	8
263	549 75	227	3,122 44	.....	.....	.....	.....	(a) 18,828 31	9
.....	.....	.....	.....	264	1,897 43	.....	.....	1,897 43	10
.....
.....	9,970 37	.....	12,071 75	.....	3,545 08	.....	6,521 62	105,612 77	.....

(a) Including \$2,400 paid by Counties Kent and Lambton.

EXPENDITURE on IMPROVEMENTS of RIVERS

MANI

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
1	Assiniboine.....	.....	\$ cts.	.....	.....
2	Fairford or Partridge Crop River.....	.....	.....	.....	.....
3	Rainy Lake and River.....	.....	.....	.....	.....
4	Red River.....	.....	5,234 90	.....	.....
	Totals .....	.....	5,234 90	.....	.....

BRITISH

1	Courtenay.....	.....	.....	.....	.....
2	Cowichan.....	223	89 75
3	Fraser.....	11 99 69
4	Naas.....
	Totals.....	11,499 69	89 75

NORTH-WEST

1	Saskatchewan.....
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ABSTRACT STATEMENT of Expenditure

1	Nova Scotia	2,842 73
2	New Brunswick.....	40,376 94	2,903 15
3	Quebec.....	.....	175,497 51	.....	16,351 12
4	Ontario .....	.....	64,004 27	.....	9,499 68
5	Manitoba.....	.....	5,234 90	.....	.....
6	North-West Territories.....	.....	.....	.....	.....
7	British Columbia.....	.....	11,499 69	.....	89 75
	Totals.....	.....	299,456 04	.....	28,843 70

EXPENDITURE

CONSTRUCTION

NOVA SCOTIA AND

1	"Canada" .....	.....	41,300 19	II	.....
2	"Cape Breton" .....	.....	17,884 38	238	1,860 00
3	"New Dominion" .....	.....	27,676 51	.....	.....
4	"St. Lawrence" .....	.....	114,911 23	.....	.....
5	Tugs.....	.....	350 50	.....	.....
6	"George McKenzie" .....	.....	.....	.....	.....
	Totals, N.S. and N.B.....	.....	202,122 81	.....	1,860 00

for the undermentioned years—*Concluded.*

OBA.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
244	1,500 00	226	2,499 63	273	19 00	288	160 00	4,178 63	1
.....	.....	.....	.....	.....	.....	288	3,951 43	3,951 43	2
244	3,000 00	.....	.....	.....	.....	.....	.....	3,000 00	3
244	(a) 1,000 00	.....	.....	.....	.....	.....	.....	6,234 90	4
....	5,500 00	.....	2,499 63	.....	19 00	.....	4,111 43	17,364 96	

COLUMBIA.

.....	.....	.....	.....	.....	.....	288	474 65	474 65	1
244	710 07	.....	.....	276	670 00	.....	.....	1,469 82	2
.....	.....	227	.....	273	.....	.....	.....	.....	.....
.....	.....	228	10,431 00	274	7,635 53	.....	.....	29,566 22	3
.....	273	610 59	289	380 25	990 84	5
.....	710 07	10,431 00	8,916 12	854 90	32,501 53

TERRITORIES.

.....	288	714 48	714 48	1
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on IMPROVEMENTS of RIVERS.

.....	1,333 77	2,000 00	2,500 00	8,676 50	1
.....	7,229 37	5,519 98	5,109 14	6,106 82	67,545 40
.....	12,014 80	.....	19,747 00	.....	29,959 46	.....	42,336 54	295,906 43	3
.....	9,970 37	.....	12,071 75	.....	3,545 08	.....	6,521 62	105,612 77	4
.....	5,500 00	.....	2,499 63	.....	19 00	.....	4,111 43	17,364 96	5
.....	.....	.....	.....	.....	.....	.....	714 48	714 48	6
.....	710 07	.....	10,431 00	.....	8,916 12	.....	854 90	32,501 53	7
.....	35,424 61	.....	51,603 13	.....	49,548 80	.....	63,445 79	528,322 07	.....

on DREDGES.

ION.

NEW BRUNSWICK.

II.	.....	.....	.....	.....	.....	II.	.....	.....	.....
.....	.....	.....	.....	.....	.....	289	1,478 25	42,778 44	1
.....	.....	.....	.....	.....	.....	.....	.....	19,744 38	2
.....	.....	.....	.....	.....	.....	289	3,150 00	30,826 51	3
.....	.....	.....	.....	.....	.....	289	1,478 25	116,389 48	4
.....	.....	.....	.....	.....	.....	.....	.....	350 50	5
223	15,000 00	.....	.....	.....	.....	.....	.....	15,000 00	6
.....	15,000 00	.....	.....	.....	.....	.....	6,106 50	225,089 31	.....

(a) St. Andrews Rapids.

EXPENDITURE on DREDGES

PRINCE ED

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	
			\$ cts.	\$	cts.
1	"Prince Edward"		23,582 07		

QUI

1	"Nipissing"				
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ON

1	"Challenge"		31,211 32		
2	Tug "C. W. Jones" or "Trudeau"		6,847 05		
	Totals, Ontario.....		38,058 37		

BRITISH

1	"Douglas"		1,447 96		
2	Tug "George"		6,250 00		
	Totals, British Columbia.....		7,697 96		

ABSTRACT STATEMENT of Expenditure

1	Nova Scotia	101,061 40		930 00
2	Prince Edward Island.....	23,582 07		
3	New Brunswick.....	101,061 41		930 00
4	Quebec.....			
5	Ontario	38,058 37		
6	British Columbia	7,697 96		
	Totals	271,461 21		1,860 00

DREDGES

1	Nova Scotia.....	101,061 40		930 00
2	Prince Edward Island.....	23,582 07		
3	New Brunswick.....	101,061 41		930 00
4	Quebec.....			
5	Ontario	38,058 37		
6	British Columbia	7,697 96		
	Totals	271,461 21		1,860 00

for the undermentioned years—*Concluded.*

WARD ISLAND.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.		
.....	23,582 07	1

BEC.

.....	273	15,221 57	289	280 00	15,501 57	1
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ARIO.

.....	31,211 32	1
.....	6,847 05	2
.....	38,058 37	

COLUMBIA.

.....	1,447 96	1
.....	6,250 00	2
.....	7,697 96	

on DREDGES—Construction.

.....	15,000 00	.....	.....	.....	.....	3,053 25	120,044 65	1
.....	.....	.....	.....	.....	.....	.....	23,582 07	2
.....	.....	.....	.....	.....	.....	3,053 25	105,044 66	3
.....	.....	.....	.....	15,221 57	.....	280 00	15,501 57	4
.....	.....	.....	.....	.....	.....	.....	38,058 37	5
.....	.....	.....	.....	.....	.....	.....	7,697 96	6
.....	15,000 00	.....	.....	15,221 57	.....	6,386 50	309,929 28	

REPAIRS.

.....	.....	II.	245	3,248 70	II.	274	1,879 59	II.	287	6,065 00	11,193 29	1
.....	.....	.....	245	1,624 35	.....	274	1,253 06	.....	287	1,000 65	3,878 06	2
.....	.....	.....	245	1,624 36	.....	274	1,879 58	.....	287	6,065 00	9,568 94	3
.....	.....	.....	245	1,243 73	.....	274	5,928 27	.....	287	2,213 07	9,385 07	4
.....	.....	.....	245	884 84	.....	274	1,382 10	.....	287	3,949 54	6,216 48	5
.....	.....	.....	245	5,158 65	.....	274	1,775 07	.....	287	2,113 65	9,047 37	6
.....	.....	.....	.....	13,784 63	.....	.....	14,097 67	.....	.....	21,406 91	49,289 21	

EXPENDITURE on DREDGING

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	
			\$ cts.		\$ cts.
1	Nova Scotia		81,243 99	239	25,958 79
2	Prince Edward Island.....		31,940 92	239	12,011 18
3	New Brunswick.....		91,488 10	239	23,327 89
4	Quebec		16,570 88	239	4,519 84
5	Ontario		22,258 88	239	9,220 85
6	British Columbia		56,771 09	239	541 64
	Totals		300,273 86	.....	75,580 19

EXPENDITURE on
CONSTRUCTION
QUEBEC

1	Saguenay District Works.....	Chicoutimi.....			
2	St. Maurice do	St. Maurice and Cham- plain.....	145,863 34		
3	Ottawa River ($\frac{1}{2}$ of Expenditure).....		23,423 09		
4	Gatineau do	Ottawa.....	28,716 94		
5	Coulonge do	Pontiac.....	318 00		
6	Black do	do	2,500 00		
7	Dumoine do	do	19,478 54		
8	Rivière des Prairies (removal of obstructions, &c).....	Laval	3,037 35		
9	Rivière des Prairies (Sault au Re- collet Pier)	do	10,466 48		
	Totals, Quebec		233,803 74		

ONTARIO

10	Ottawa River ($\frac{1}{2}$ of Expenditure).....		23,423 09	II.	
11	Madawaska River.....	Renfrew.....	1,350 00		
12	Petawawa do	do	7,713 00		
13	South Nation do	Dundas			
14	Newcastle District Works.....	Victoria, Ontario, Peter- boro', Hastings, North- umberland.....	5,043 20	238	591 28
	Totals Ontario.....		37,529 29		591 28
	Grand Totals Quebec and Ontario		271,333 03		591 28

for the undermentioned Years.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
263	28,822 72	246	33,862 28	274	22,000 00	287			
263	9,164 07	246	11,050 63	274	8,798 53	290	26,061 78	217,949 56	
263	28,002 03	246	15,630 19	274	10,508 03	290	8,355 92	81,321 25	
263	6,919 05	246 (a)	.....	274	2,377 64	290	11,324 94	180,281 18
263	8,743 96	246	3,226 58	274	2,167 03	290	9,215 76	39,603 17	
263	920 35	246	9,598 39	274	222 00	290	1,311 48	46,928 78	
						290	8,341 54	76,395 01	
.....	82,572 18	.....	73,368 07	.....	46,073 23	.....	64,611 42	642,478 95

SLIDES and BOOMS.

TION.

BEC.

II.		II.		II.		II.			
.....	.....	.....	.....	.....	.....	291	2,418 50	2,418 50	1
.....	.....	.....	.....	.....	.....	291			
.....	.....	245	11,074 50	275	.....	291			
.....	.....	.....	.....	276	6,677 33	292	5,300 08	168,915 25	2
265	400 00	245	409 50	276	509 84	291	217 50	24,150 43	3
.....	.....	.....	.....	.....	.....	.....	.....	29,526 44	4
.....	.....	.....	.....	.....	.....	.....	.....	318 00	5
.....	.....	.....	.....	.....	.....	.....	.....	2,500 00	6
.....	.....	.....	.....	.....	.....	.....	.....	19,478 54	7
.....	.....	.....	.....	.....	.....	.....	.....	3,037 35	8
.....	.....	.....	.....	.....	.....	.....	.....	10,466 48	9
.....	400 00	.....	11,484 00	.....	7,187 17	.....	7,936 08	260,810 99	

RIO.

II.		II.		II.		II.			
.....	.....	.....	.....	276	509 84	291	217 50	24,150 43	10
.....	.....	.....	.....	.....	.....	291	4,317 81	5,667 81	11
.....	.....	.....	.....	.....	.....	.....	.....	7,713 00	12
.....	.....	245	488 45	.....	.....	.....	.....	488 45	13
.....		
.....	.....	.....	.....	.....	.....	271	645 10	6,279 58	14
.....		
.....	.....	.....	488 45	.....	509 84	.....	5,180 41	44,299 27	
.....	400 00	.....	11,972 45	.....	7,697 01	.....	13,116 49	305,110 26	

(a) Included in Harbours.

EXPENDITURE on SLIDES and BOOMS
STAFF AND
QUE

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
	Saguenay District Works—		\$ cts.		
1	Collection.....	Chicoutimi	400 23	.....	.....
2	Staff	do	7,442 43	246	882 85
3	Repairs	do	14,396 77	246	597 60
	Totals .....	.....	22,239 43	.....	1,480 45
	St. Maurice District Works—				
4	Collection, &c.....	St. Maurice and Cham- plain	3,987 44	246	550 00
5	Staff	do do	136,453 26	246	12,759 50
6	Repairs	do do	63,647 78	246	6,232 87
	Totals .....	.....	204,088 48	.....	19,542 37
	Ottawa Works—				
7	Staff ($\frac{1}{2}$ of expenditure) .....	.....	87,956 95	245	9,954 19
	Repairs, viz.:				
8	Ottawa River ($\frac{1}{2}$ of expen- diture).....	.....	53,533 79	245	1,159 93
9	Gatineau River	Ottawa.....	21,962 17	.....	.....
10	Coulange do	Pontiac	13,850 15	.....	.....
11	Black do	do	18,269 59	.....	.....
12	Dumoine do	do	10,992 14	.....	.....
	Totals, Repairs.....	.....	118,607 84	.....	1,159 93
13	Rivière des Prairies—Sault au Recol- let Pier	Laval	1,891 13	.....	.....
	Grand Totals, Quebec...	.....	434,783 83	.....	32,136 94

ONTA

1	Ottawa District Works— Staff ($\frac{1}{2}$ of expenditure) .....	.....	87,956 95	245	9,954 18
	Repairs, viz.:				
2	Ottawa River ($\frac{1}{2}$ of expen- diture).....	.....	53,433 80	245	1,159 93
3	Madawaska River.....	Renfrew	53,812 02	245	567 06
4	Petawawa do	do	25,220 42	245	1,455 32
5	South Nation do	Dundas .....	.....	.....	.....
	Totals, Repairs .....	.....	132,466 24	.....	3,182 31
	Newcastle Works—				
6	Collection, &c.....	{ Victoria, Ontario, Peter- boro', Hastings and Northumberland	67 20	246	16 22
7	Staff		12,996 87	246	2,366 45
8	Repairs		45,136 48	246	5,963 11
	Totals .....	.....	58,200 55	.....	8,345 78
	Grand Totals, Ontario..	.....	278,623 74	.....	21,482 27

for the undermentioned years—*Continued.*

REPAIRS.

BEC.

Year ended 30th June.								Total for 15 Years to 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	.....	.....	.....	.....	.....	.....	.....	400 23	1
271	753 05	255	710 05	285	853 68	303	1,438 58	12,080 64	2
271	5,491 02	255	4,611 74	285	6,210 39	303	5,064 21	36,371 73	3
.....	6,244 07	.....	5,321 79	.....	7,064 07	.....	6,502 79	48,852 60	
.....	
272	559 00	256	773 52	286	578 50	304	710 00	7,158 46	4
271	13,355 19	255	14,823 01	284	14,993 41.	301	17,768 48	210,152 85	5
271	4,291 19	255	8,497 07	284	3,831 27	301	9,167 21	95,667 39	6
.....	18,205 38	.....	24,093 60	.....	19,403 18	.....	27,645 69	312,978 70	
.....	
271	10,318 37	254	8,732 64	284	9,543 03	302	11,051 61	137,556 79	7
.....	
271	1,831 76	247	.....	.....	.....	.....	.....	.....
271	269 39	254	2,290 93	284	1,076 54	302	3,828 92	63,721 87	8
271	288 09	254	1,294 60	284	744 87	302	1,128 92	25,399 95	9
271	340 27	254	699 02	284	2,427 10	302	677 73	17,942 09	10
.....	.....	254	749 31	284	382 85	302	587 56	20,329 58	11
.....	.....	255	225 01	284	1,127 46	302	2,192 05	14,536 66	12
.....	2,729 51	.....	5,258 87	.....	5,758 82	.....	8,415 18	141,930 15	
.....	
.....	.....	255	493 22	.....	.....	302	301 38	2,685 73	13
.....	37,497 33	.....	43,900 12	.....	41,769 10	.....	53,916 65	614,003 97	

RIO.

271	10,318 36	254	8,732 65	284	9,543 03	302	11,051 61	137,556 78	1
.....	.....	254	1,592 39	284	1,076 54	302	3,828 92	61,091 58	2
271	844 41	254	2,361 70	284	1,994 25	302	4,398 22	63,977 66	3
271	464 89	254	738 72	284	2,851 22	302	990 53	31,721 10	4
.....	.....	.....	.....	.....	122 19	302	528 66	650 85	5
.....	1,309 30	.....	4,692 81	.....	6,044 20	.....	9,746 33	157,441 19	
.....	.....	.....	.....	.....	.....	303	77 93	161 35	6
271	2,238 21	255	614 07	285	529 00	303	582 50	19,327 10	7
271	5,984 78	255	1,050 34	.....	.....	303	3,028 53	61,163 24	8
.....	8,222 99	.....	1,664 41	.....	529 00	.....	3,688 96	80,651 69	
.....	19,850 65	.....	15,089 87	.....	16,116 23	.....	24,486 90	375,649 66	

EXPENDITURE on SLIDES and BOOMS
STAFF AND
GENE

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				\$	cts.
1	Generally			248	48 5

ABSTRACT STATEMENT of Expenditure on SLIDE

1	Quebec	434,783 83	.....	32,136 9
2	Ontario	278,623 74	.....	21,482 2
3	Generally .....		.....	48 5
	Totals	713,407 57	.....	53,667 7

EXPENDITURE on ROAD

NOV

1	Mail Road between Liverpool and Annapolis.....	1,509 92	
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NE

1	Apohaqui Bridge.....	King's.....	2,368 34	
---	----------------------	-------------	----------	-------	--

QU

			II.	
1	Gatineau Bridge.....	Ottawa	272 10
2	Gulf Road.....	Rimouski & Bonaventure.....	10,000 00
3	Isle aux Noix (roadway and bridging).....	St. John's .....		.....
4	Métapédia Road.....	Bonaventure	19,729 70	240 500 0
5	Ottawa Union Suspension Bridge (b).....	Ottawa and Carleton.....	3,418 52	245 107 3
6	Petite Nation Bridge.....	Prescott	685 86	.....
		(a)		
7	Portage du Fort Bridge.....	Pontiac.....	17,066 20	.....
8	Port Lewis and Huntingdon Road.....	Huntingdon.....	12,093 25	.....
9	Restigouche Road.....	Rimouski & Bonaventure.....	8,335 82	.....
10	Témiscouata do	Témiscouata.....	20,991 16	.....
11	Generally		3,127 00	.....
	Totals, Quebec.....		95,719 61	..... 607 3

(a) Including \$4,000 contributed by the Local Government of Ontario, also \$1,500 by the municipali

(b) Proportion of expenditure.

for the undermentioned years—*Concluded.*

REPAIRS.

ALLY.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	48 52	1

and BOOMS—STAFF and REPAIRS.

.....	37,497 33	.....	43,900 12	.....	41,769 10	.....	53,916 65	644,003 97	1
.....	19,850 65	.....	15,089 87	.....	16,116 23	.....	24,486 90	375,649 66	2
.....	.....	.....	.....	.....	.....	.....	.....	48 52	3
.....	57,347 98	.....	58,989 99	.....	57,885 33	.....	78,403 55	1,019,702 15	

and BRIDGES.

SCOTIA.

.....	1,509 92	1
-------	-------	-------	-------	-------	-------	-------	-------	----------	---

BRUNSWICK.

.....	2,368 34	1
-------	-------	-------	-------	-------	-------	-------	-------	----------	---

BEC.

II.		II.		II.		II.			
.....	.....	.....	.....	.....	.....	.....	.....	272 10	1
.....	.....	.....	.....	.....	.....	.....	.....	10,000 00	2
.....	.....	.....	276	838 67	.....	.....	.....	838 67	3
.....	.....	.....	.....	.....	291	223 80	.....	20,453 50	4
.....	.....	.....	276	.....	.....	.....	.....	.....	.....
271	154 98	.....	284	251 67	291	2,456 40	.....	6,388 94	5
.....	.....	.....	.....	.....	.....	.....	.....	685 86	6
.....	.....	.....	.....	.....	.....	.....	.....	(a)	.....
.....	.....	.....	.....	.....	292	400 00	.....	17,466 20	7
.....	.....	.....	.....	.....	.....	.....	.....	12,093 25	8
.....	.....	.....	.....	.....	.....	.....	.....	8,335 82	9
.....	247	899 09	276	1,100 43	292	3,049 15	.....	26,039 83	10
.....	.....	.....	.....	.....	.....	.....	.....	3,127 00	11
.....	154 98	.....	899 09	2,190 77	.....	6,129 35	.....	105,701 17	

EXPENDITURE on ROADS and BRIDGES

ONT

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	\$	cts.
1	Des Joachims Bridge	Renfrew and Pontiac .....	.....	.....	.....	.....
2	Dunnville do	Monck	2,573	65	.....	.....
3	Fort William Road	Algoma	209,195	38	.....	.....
4	Ottawa Union Suspension Bridge (b)	Ottawa and Carleton	3,443	49	245	107 37
5	do Chaudière Bridge .....	.....	20,000	00	.....	.....
6	Red River route and transportation service—Construction (b) .....	.....	452,415	21	.....	.....
7	Red River route and transportation service—Staff and repairs (b) .....	.....	521,778	01	239	3,103 81
8	Windsor and Scugog Roads .....	.....	581	65	.....	.....
9	York Roads .....	.....	1,644	96	.....	.....
	To a.s, Ontario .....	.....	1,211,632	35	.....	3,211 18

MANI

1	Boats for transportation service .....	.....	72,193	01	.....	.....
2	Fort Garry Road .....	.....	226,513	67	.....	.....
3	do Bridge (over Red River) .....	.....	2,967	10	.....	.....
4	Red River route and transportation service—Construction (b) .....	.....	64,630	75	.....	.....
5	Red River route and transportation service—Staff and repairs (b) .....	.....	74,539	71	239	443 40
	Totals, Manitoba .....	.....	440,844	24	.....	443 40

ABSTRACT STATEMENT of Expendi

1	Nova Scotia .....	.....	1,509	92	.....	.....
2	New Brunswick .....	.....	2,368	34	.....	.....
3	Quebec .....	.....	95,719	61	.....	607 37
4	Ontario .....	.....	1,211,632	35	.....	3,211 18
5	Manitoba .....	.....	440,844	24	.....	443 40
	Totals .....	.....	1,752,074	46	.....	4,261 95

EXPENDITURE on TELEGRAPH LINES

CONSTRU

NOVA

1	Land and Cable Telegraph Lines (Canso to Halifax, Meat Cove to Sydney, Low Point to Lingan)
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(b) Proportion of expenditure.

for the undermentioned years—*Concluded.*
ARIO.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....				266	750 69	277	157 62	908 31	1
.....								2,573 65	2
.....								209,195 38	3
.....				276		291			
271	154 98			284	251 67	303	2,475 27	6,432 78	4
.....								20,000 00	5
.....									
.....								452,415 21	6
.....									
264									
265	271 26	247	702 23	278	641 33	.....		526,496 64	7
.....								581 65	8
.....								1,644 96	9
.....									
.....	426 24	.....	702 23	.....	1,643 69	.....	2,632 89	1,220,248 58	

TOBA.

.....								72,193 01	1
.....								226,513 67	2
.....								2,967 10	3
.....									
.....								64,630 75	4
.....									
.....								74,983 11	5
.....									
.....								441,287 64	

ture on ROADS and BRIDGES.

.....								1,509 92	1
.....								2,368 34	2
.....	154 98		899 09	.....	2,190 77	.....	6,129 35	105,701 17	3
.....	426 24		702 23	.....	1,643 69	.....	2,632 89	1,220,248 58	4
.....								441,287 64	5
.....									
.....	581 22	.....	1,601 32	.....	3,834 46	.....	8,762 24	1,771,115 65	

for the undermentioned years.

TION.
SCOTIA.

.....		II.		II.		II.			
.....						245			
.....						246			
.....		248	15,695 85	241	17,480 00	246			
.....				275		291	34,770 03	67,945 88	1

EXPENDITURE on TELEGRAPH LINES

CONSTRUCTED

NEW

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	\$	cts.
1	Land and Cable Telegraph Lines (proportion of expenditure), Grand Manan to Campobello and East Port					

QUÉBEC

1	Land and Cable Telegraph Lines, Lower St. Lawrence (proportion of Expenditure)					
2	Telegraph Lines, North Shore of St. Lawrence (Baie St. Paul to Chicoutimi, &c.)					
	Totals					

MANITOBA

1	Telegraph Lines		72 00			
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BRITISH COLUMBIA

1	Telegraph Lines		9,044 00	273		19,797 22
---	-----------------------	--	----------	-----	--	-----------

GENERAL

1	Telegraph and Signal Service Generally					
---	--	--	--	--	--	--

ABSTRACT STATEMENT of Expenditure on

1	Nova Scotia					
2	New Brunswick					
3	Quebec					
4	Manitoba		72 00			
5	British Columbia		9,044 00			19,797 22
6	Generally					
	Totals		9,116 00			19,797 22

for the undermentioned years.

TION—*Concluded.*

BRUNSWICK.

Year ended 30th June.										Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.					
\$	cts.	II.	\$	cts.	II.	\$	cts.	II.	\$	cts.	
.....	241	13,940	00	.....	.....	13,940	

BEC.

.....	.....	248	5,241 76	241	147,748 01	245	3,351 63	156,341 40	1
.....			275	12,940 51	291	11,676 83	24,617 34	2
.....		5,241 76	160,688 52	15,028 46	180,958 74	

TOBA.

.....	72	00	1
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COLUMBIA.

.....	275	56,328	76	291	4,709	51	89,879	49	1
-------	-------	-------	-------	-----	--------	----	-----	-------	----	--------	----	---

ALLY.

.....	291	7,254	27	7,254	27	1
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TELEGRAPH LINES—Construction.

.....	15,695	85	17,480	00	34,770	03	67,945	88	1
.....	13,940	00	13,940	00	2
.....	.....	5,241	76	.....	160,688	52	.....	15,028	46	180,958	74	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	00	4
.....	.....	.....	.....	.....	56,328	76	.....	4,709	51	89,879	49	5
.....	.....	.....	.....	.....	.....	.....	.....	7,254	27	7,254	27	6
.....	.....	20,937	61	.....	248,437	28	.....	61,762	27	360,050	38	

EXPENDITURE on TELEGRAPH LINES

WORKING

NOV

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
			\$	cts.	II.	\$ cts.
1	Land and Cable Telegraph Lines (proportion of expenditure).....	.....	.....	.....	.....	.....
PRINC						
2	Subsidy to American Telegraph Co... ..	.....	6,813	31	247	1,946 60
NE						
3	Land and Cable Telegraph Lines (proportion of expenditure).....	.....	.....	.....	.....	.....
QU						
4	Land and Cable Telegraph Lines (proportion of expenditure).....	.....	.....	.....	.....	.....
BRITIS						
5	Telegraph Lines.....	.....	191,223	95	247	37,148 7
	Grand Totals, Working Expenses.....	.....	198,037	26	.....	39,095 4

EXPENDITURE o

CONSTRU

NOV

1	Anet Island.....	.....	218	03	.....	.....
2	Arichat.....	.....	6,905	80	.....	.....
3	Barrington.....	.....	292	00	.....	.....
4	Battery Point (or Lunenburg).....	.....	28	81	.....	.....
5	Bird Island.....	.....	121	67	.....	.....
6	Black Rock Point.....	.....	2,768	00	.....	.....
7	Boar's Head.....	.....	138	30	.....	.....
8	Cape St. George.....	.....	39	13	.....	.....
9	Cape St. Mary.....	.....	4,667	57	.....	.....
10	Cariboo Island.....	.....	3,221	02	.....	.....
11	Devil's Island.....	.....	310	14	.....	.....
12	Egg Island.....	.....	324	60	.....	.....
13	Little Hope Island.....	.....	12,295	09	.....	.....
14	Meagher's Point.....	.....	486	43	.....	.....
15	Moser's Island.....	.....	3,389	84	.....	.....
	Carried forward .....	.....	35,206	43	.....	.....

for the undermentioned years—*Concluded.*

EXPENSES.

SCOTIA.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.	Number.
187 .		1880.		1881.		1882.			
I.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	
.....	304	2,163 79	2,163 79	1

EDWARD ISLAND.

II. 273	1,946 66	II. 257	1,946 66	II. 286	1,946 66	304	1,946 66	16,546 61	2
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BRUNSWICK.

.....	304	2,163 78	2,163 78	3
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BEC.

.....	304	4,327 58	4,327 58	4
-------	-------	-------	-------	-------	-------	-----	----------	----------	---

COLUMBIA.

272	28,270 73	257	35,578 30	286	29,801 83	305	38,646 87	361,120 42	5
.....	30,667 39	.....	37,524 96	.....	31,748 49	.....	49,248 68	386,322 18	

LIGHTHOUSES.

TION.

SCOTIA.

.....	.....	.....	.....	.....	.....	.....	.....	218 03	1
.....	.....	.....	.....	.....	.....	.....	.....	6,905 80	2
.....	.....	.....	.....	.....	.....	.....	.....	292 00	3
.....	.....	.....	.....	.....	.....	.....	.....	28 81	4
.....	.....	.....	.....	.....	.....	.....	.....	121 67	5
.....	.....	.....	.....	.....	.....	.....	.....	2,768 00	6
.....	.....	.....	.....	.....	.....	.....	.....	138 30	7
.....	.....	.....	.....	.....	.....	.....	.....	39 13	8
.....	.....	.....	.....	.....	.....	.....	.....	4,687 57	9
.....	.....	.....	.....	.....	.....	.....	.....	3,221 02	10
.....	.....	.....	.....	.....	.....	.....	.....	310 14	11
.....	.....	.....	.....	.....	.....	.....	.....	324 60	12
.....	.....	.....	.....	.....	.....	.....	.....	12,295 09	13
.....	.....	.....	.....	.....	.....	.....	.....	486 43	14
.....	.....	.....	.....	.....	.....	.....	.....	3,389 84	15
.....	.....	.....	.....	.....	.....	.....	.....	35,206 43	

EXPENDITURE on LIGHT HOUSES
CONSTRUCTION
NOVA SCO

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
	Brought forward.		\$ cts. 35,206 43		
16	Parrsboro'		1,254 45		
17	Peggy's Point.....		3,010 84		
18	Pomkett Island.....		1,590 43		
19	Port Hood Wharf.....		47 56		
20	Port Medway.....		68 13		
21	Pubnico.....		24 51		
22	Ram Rock Beacon.....		39 96		
	Totals.....		41,242 31		

NEW

1	Cape Jourimain		4,060 34		
2	Maisonette.....		216 65		
3	Portage Island and Preston's Beach.		850 00		
4	Shediac Beacon Light.....		400 00		
5	St. John Beacon.....		272 78		
6	St. John River Beacon Light.....		2,751 40		
	Totals.....		8,551 17		

QUE

1	Bicquet Island.....		48 00		
2	Cap Rosier.....		80 00		
3	Paspébiac.....		216 81		
4	Point St. Laurent.....		15,979 70		
	Totals.....		16,324 51		

ONT.

1	Byng Inlet.....		357 69		
2	Clapperton Island.....		605 20		
3	False Duck do		800 00		
4	Gibraltar Point.....		55 00		
5	Gull Island.....		192 80		
6	Killarney (Leading Light).....		660 20		
7	Little Current.....		660 20		
8	Michael's Point.....		454 94		
9	Point Pleasant.....		357 72		
10	St. Ignace.....		605 03		
11	Sulphur Island.....		2,359 20		
	Totals.....		7,107 98		

BRITISH

1	Cape Beale.....		2,362 54		
---	-----------------	--	----------	--	--

for the undermentioned years—*Continued.*

—*Continued.*

TIA—*Concluded.*

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.		Number.
1879.		1880.		1881.		1882.				
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.		
								35,206 43	1	
								1,254 45	2	
								3,010 84	3	
								1,590 43	4	
								47 56	5	
								68 13	6	
								24 51	7	
								39 96	8	
								41,242 31		

BRUNSWICK.

										4,060 34	1
										216 65	2
										850 00	3
										400 00	4
										272 78	5
										2,751 40	6
										8,551 17	

REC.

										48 00	1
										80 00	2
										216 81	3
										15,979 70	4
										16,324 51	

RIO.

										357 69	1
										605 20	2
										800 00	3
										55 00	4
										192 80	5
										660 20	6
										660 20	7
										454 94	8
										357 72	9
										605 03	10
										2,359 20	11
										7,107 98	

COLUMBIA.

										2,362 54	1
--	--	--	--	--	--	--	--	--	--	----------	---

ABSTRACT STATEMENT of Expenditure

Number.	Name of Work.	County.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.	
				II.	\$ cts.
			\$ cts		
1	Nova Scotia.....		41,242 31		
2	New Brunswick.....		8,551 17		
3	Quebec		16,324 51		
4	Ontario.....		7,107 98		
5	British Columbia.....		2,362 54		
	Totals.....		75,588 51		

EXPENDITURE on MISCELLANEOUS

	Surveys and Inspections—			II.	
1	Nova Scotia.....		27,785 28	240	2,794 80
2	Prince Edward Island.....		1,237 20	240	3,494 76
3	New Brunswick.....		33,487 56	240	5,589 58
4	Quebec.....		47,318 88	240	2,534 92
5	Ontario.....		125,638 31	240	13,090 68
6	Manitoba.....				
7	North-West Territories.....		681 99		
8	British Columbia.....		369 50		
9	Generally.....				
	Totals, Surveys.....		236,518 72		27,504 74
	Survey Coasts Capes Tormentine and Traverse—				
10	Prince Edward Island.....				
11	New Brunswick.....				
	Totals.....				
12	Arbitrations.....		53,276 11	240	6,883 85
	Tug Service between Montreal and Kingston—				
13	Quebec.....		48,151 43		
14	Ontario.....		48,151 41		
	Totals, Tug Service.....		96,302 84		
15	Agent and Contingencies, B.C.....		5,055 35	247	2,687 55
16	Relief to Fishermen, Labrador.....				
	Sundries—				
17	Stationery, &c.....		1,365 70	245 246	2,790 52
	Grand Totals, Miscellaneous.....		392,518 72		39,866 66

on LIGHT HOUSES—Construction.

Year ended 30th June.								Total for 15 Years ended 30th June, 1882.		Number.
1879.		1880.		1881.		1882.				
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.		
.....	41,242 31	1	
.....	8,551 17	2	
.....	16,324 51	3	
.....	7,107 98	4	
.....	2,362 54	5	
.....	75,588 51		

for the undermentioned years.

II.		II.		II.		II.			
264	7,983 91	247	4,185 56	276	237 80	.....	.....	42,987 35	1
264	1,683 30	247	3,002 28	276	87 80	.....	.....	9,505 34	2
264	4,130 79	247	2,620 44	276	150 00	.....	.....	45,978 37	3
264	7,759 78	247	13,963 59	276	8,284 92	292	17,047 62	96,909 71	4
264	11,860 09	247	10,116 48	276	10,916 40	292	2,159 55	173,781 51	5
.....	.....	.....	.....	276	1,087 50	292	2,969 34	4,056 84	6
.....	.....	.....	.....	.....	.....	.....	.....	681 99	7
.....	.....	.....	.....	276	260 63	292	821 89	1,452 02	8
.....	.....	247	11,444 51	276	3,764 14	292	4,061 69	19,270 34	9
.....	33,417 87	.....	45,332 86	.....	24,789 19	.....	27,060 09	394,623 47	
.....	.....	.....	.....	.....	.....	.....	.....	.....	10
265	2,500 00	.....	.....	.....	.....	.....	.....	2,500 00	11
265	2,500 00	.....	.....	.....	.....	.....	.....	2,500 00	
.....	5,000 00	.....	.....	.....	.....	.....	.....	5,000 00	
264	7,261 22	248	10,035 38	277	9,697 53	293	3,901 51	91,055 60	1
.....	
.....	.....	.....	.....	.....	.....	.....	.....	48,151 43	13
.....	.....	.....	.....	.....	.....	.....	.....	48,151 41	14
.....	.....	.....	.....	.....	.....	.....	.....	96,302 84	
272	2,495 70	256	2,818 85	285	1,690 90	303	2,195 84	16,944 19	15
.....	.....	.....	.....	277	437 24	.....	.....	437 24	16
270	.....	.....	.....	.....	.....	.....	.....	.....
271	2,056 00	.....	.....	.....	.....	.....	.....	6,211 22	17
.....	50,230 79	.....	58,187 09	.....	36,614 86	.....	33,157 44	610,575 56	

STATEMENT showing Amounts contributed by Municipalities, &c., towards
Statements, from 1st July,

Number.	Name of Work.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.	
		\$	cts.	\$	cts.
	PUBLIC BUILDINGS—				
1	Quebec Citadel "Cliff" (Corporation of the City of Quebec)				
2	do Fortifications (Her Majesty the Queen's Gift)				
3	Ottawa Drill Shed (Corporation of the City of Ottawa)				
	Totals, Public Buildings				
	HARBOURS—				
4	Bayfield (Municipality of Stanley)	10,000	00		
5	Cobourg (Commissioners, Harbour Trust, Cobourg)	25,507	49		
6	Collingwood (Northern Railway Co.)	28,268	26		
7	Goderich (Municipality, Township of Goderich)	10,000	00		
8	Meaford (do St. Vincent)	10,000	00		
9	Rondeau (County Council, Kent) ..				
	Totals, Harbours	83,775	75		
	RIVERS—				
10	Napanee, Ontario	5,000	00		
11	Salmon do	2,400	00		
	Totals, Rivers	7,400	00		
	ROADS AND BRIDGES—				
12	Portage du Fort Bridge (Grant, Ontario Government)	5,500	00		
	Grand Totals	96,675	75		

the Construction of the undermentioned Works, and included in previous 1867, to 30th June, 1882.

Year ended 30th June.							Total for 15 Years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.		
II.	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.	\$ cts.	
				247	2,500 00		2,500 00	1
				246	2,433 33		2,433 33	2
276	2,050 00	228	2,950 00				5,000 00	3
	2,050 00		2,950 00		4,933 33		9,933 33	
							10,000 00	4
							25,507 49	5
							28,268 26	6
							10,000 00	7
							10,000 00	8
					274	300 00	300 00	9
						300 00	84,075 75	
							5,000 00	10
							2,400 00	11
							7,400 00	
							5,500 00	12
	2,050 00		2,950 00		4,933 33		300 00	
							106,909 08	

COMPARATIVE STATEMENT of Expenditure on PUBLIC

Number.	Name of Work.	Expenditure from 1st July, 1867, to 30th June, 1877.	1878.
		\$ cts.	\$ cts.
1	Railways—Construction.....	33,476,607 70	2,643,741 73
2	do Working Expenses.....	10,059,936 93	2,032,873 05
3	Canals—Construction.....	10,646,249 18	3,843,338 62
4	do Staff, Repairs, &c.....	3,353,120 32	340,299 25
	Totals, Railways and Canals.....	57,535,914 13	8,860,252 65
5	Public Buildings—Construction.....	4,917,495 77	518,908 74
6	do Repairs, &c.....	1,601,384 55	282,380 18
7	Harbours and Breakwaters.....	2,369,079 06	225,066 21
8	Improvements of Rivers.....	299,456 04	28,843 70
9	Dredges—Construction.....	271,461 21	1,860 00
10	do Repairs.....		
11	Dredging.....	300,273 86	75,580 11
12	Slides and Booms—Construction.....	271,333 03	591 21
13	do do Staff and Repairs.....	713,497 57	53,667 71
14	Roads and Bridges.....	1,752,074 46	4,261 91
15	Telegraph Lines—Construction.....	9,116 00	
16	do Working Expenses.....	198,037 26	39,095 41
17	Lighthouses—Construction.....	75,588 51	
	Miscellaneous—		
18	Surveys.....	236,518 72	27,504 71
19	Survey Coasts Capes Tormentine and Traverse.....		
20	Arbitrations.....	53,276 11	6,863 81
21	Tug Service between Montreal and Kingston.....	96,302 84	
22	Relief of Fishermen, Labrador.....		
23	Agent and Contingencies, B. C.....	5,055 35	2,687 81
24	Sundries.....	1,365 70	2,790 81
	Totals, Public Works.....	13,171,226 04	1,270,122 11
	Grand Totals.....	70,707,140 17	10,130,374 76

(a) Including \$ 9,933 33 contributed by Municipalities, &c., see page 139.

(b) do 84,075 75 do do do

(c) do 7,400 00 do do do

(d) do 5,500 00 do Local Government, Ontario, see page 139.

Total.... \$106,909 08

(e) Shows only expenditure incurred through Public Works Department, see page 173.

WORKS and BUILDINGS for the undermentioned years.

Year ended 30th June.				Total for 15 Years ended 30th June, 1882.	Number.
1879.	1880.	1881.	1882.		
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
2,507,053 71	6,109,599 14	5,577,236 73	5,176,832 81	55,491,071 82	1
2,233,496 34	1,851,489 26	2,220,421 39	2,311,423 22	20,709,640 19	2
3,064,093 61	2,123,366 34	2,100,212 78	1,670,268 74	23,447,564 27	3
335,402 06	379,503 55	383,963 35	446,969 14	5,239,257 67	4
8,140,050 72	10,463,958 29	10,281,864 25	9,605,493 91	104,887,533 95	
374,109 76	445,344 26	512,882 31	544,032 73	(a) 7,312,773 62	5
351,077 47	296,603 62	215,975 34	309,189 18	3,056,610 29	6
188,288 07	93,714 25	167,786 77	297,406 84	(b) 3,341,341 26	7
35,424 61	51,603 13	49,548 80	63,145 79	(c) 528,322 07	8
15,000 00	.....	15,221 57	6,386 50	309,929 28	9
.....	13,784 63	14,097 67	21,406 91	49,289 21	10
82,572 18	73,368 07	46,073 23	64,611 42	642,478 95	11
400 00	11,972 45	7,697 01	13,116 49	305,110 26	12
57,347 98	58,989 99	57,885 33	78,403 55	1,019,702 15	13
581 22	1,601 32	3,834 46	8,762 24	(d) 1,771,115 65	14
19,797 22	20,937 61	248,437 28	61,762 27	360,050 38	15
30,667 39	37,524 96	31,748 49	49,248 68	386,322 18	16
.....	.....	.....	.....	(e) 75,588 51	17
33,417 87	45,332 86	24,789 19	27,060 09	394,623 47	18
5,000 00	.....	.....	.....	5,000 00	19
7,261 22	10,035 38	9,697 53	3,901 51	91,055 60	20
.....	.....	.....	.....	96,302 84	21
.....	.....	437 24	.....	437 24	22
2,495 70	2,818 85	1,690 90	2,195 84	16,944 19	23
2,056 00	.....	.....	.....	6,212 22	24
1,205,496 69	1,163,631 38	1,407,803 12	1,550,930 04	19,769,209 37	
9,345,547 41	11,627,589 67	11,689,667 37	11,156,423 95	124,656,743 32	

GENERAL ABSTRACT of Expenditure on PUBLIC WORKS and BUILDING

Number.	WORKS.	Nova Scotia.	ENTERED CONFEDERATION.	
			1st July, 1873.	New Brunswick
			P. E. Island.	
		\$ cts.	\$ cts.	\$ cts.
1	Intercolonial Railway—Construction	6,637,722 09	.....	11,475,280 00
2	do Working Expenses.....	4,800,301 44	.....	8,402,006 00
3	Government Railways, Maritime Provinces—Construction	1,801,461 89	352,255 49	824,688 00
4	Government Railways, Maritime Provinces—Working Expenses.....	1,406,933 37	1,539,556 31	833,854 00
5	Coteau Landing Railway Bridge .....	.....	.....	.....
6	Pacific Railway—Construction.....	.....	.....	.....
7	do Working Expenses .....	.....	.....	.....
8	Canals—Construction	496,797 80	.....	44,383 00
9	do Staff and Repairs.....	23,771 21	.....	.....
	Totals, Railways and Canals	15,166,987 80	1,891,811 80	21,570,220 00
10	Public Buildings—Construction.....	164,110 00	75,253 68	1,248,675 00
11	do Repairs, &c.....	64,817 31	19,879 55	46,820 00
12	Harbours and Breakwaters	760,603 20	177,283 15	463,359 00
13	Improvements of Rivers.....	8,676 50	.....	67,540 00
14	Dredges—Construction	120,044 65	23,582 07	105,040 00
15	do Repairs.....	11,193 29	3,878 06	9,560 00
16	Dredging.....	†217,949 56	†81,321 25	†180,280 00
17	Slides and Booms—Construction .....	.....	.....	.....
18	do Staff and Repairs.....	.....	.....	.....
19	Roads and Bridges.....	1,509 92	.....	2,360 00
20	Telegraph Lines—Construction	66,945 88	.....	14,940 00
21	do Working Expenses	2,163 79	16,546 61	2,160 00
22	Lighthouses—Construction	41,242 31	.....	8,550 00
	Miscellaneous, viz :—			
23	Surveys	42,987 35	9,505 34	45,970 00
24	Survey Coasts, Capes Tormentine and Traverse.....	.....	2,500 00	2,500 00
25	Arbitrations .....	.....	.....	.....
26	Tug Service between Montreal and Kingston.....	.....	.....	.....
27	Agent and Contingencies, British Columbia.....	.....	.....	.....
28	Sundries.....	.....	.....	.....
	Totals, Public Works.....	1,502,243 76	409,749 71	2,197,790 00
	Grand Totals.....	16,669,231 56	2,301,561 51	23,768,010 00

a Including \$1,786 20 charged to "Consolidated Fund." See Public Accounts 1881-82, Part I.
b, c, d, e, f—For remarks, see pages 140 and 141.

† Have been unable to apportion this expenditure to the several services on account of which it was incurred.
 * Includes only such of the expenditure for Dredging as could not be apportioned to any special service.

The above Statements, which are a compilation both from the "Public Accounts" and the Bills in the Public Accounts for 1881-82.

DEPARTMENT OF PUBLIC WORKS,
 OTTAWA, 20th January, 1883.

from 1st July, 1867 (date of Confederation), to 30th June, 1882.

Quebec.	Ontario.	ENTWED CONFEDERATION.			Miscellaneous not Apportioned to any of the Provinces.	Total to 30th June, 1882.	Number.
		15th July, 1870.		20th July, 1871.			
		Manitoba.	North-West Territories.	British Columbia.			
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
8,351,014 34						26,464,017 42	1
3,418,578 72						16,620,888 18	2
						2,978,406 66	3
						3,770,344 14	4
522 00						522 00	5
	13,116,950 42	5,641,181 85	2,715,811 86	4,574,181 61		a 26,048,125 74	6
		318,407 87				318,407 87	7
9,353,593 94	13,510,223 68		32,675 65		9,885 67	23,447,564 27	8
2,095,077 47	3,064,657 83				55,751 16	5,239,257 67	9
23,218,786 47	29,691,831 93	5,959,589 72	2,748,487 51	4,574,181 61	65,636 83	104,987,533 95	
1,747,702 46	3,157,545 20	326,247 47	228,35 40	260,473 98	104,633 33	b 7,312,773 62	10
353,308 05	2,497,058 41	53,194 16	6,808 65	14,051 21	667 05	3,056,610 29	11
318,505 82	1,607,183 00	223 39		8,099 76	6,083 35	c 3,241,341 26	12
295,906 43	105,612 77	17,264 96	714 48	32,501 53		d 528,322 07	13
15,501 57	38,058 37			7,697 96		309,929 28	14
9,385 07	6,216 48			9,047 37		49,289 21	15
*39,603 17	*46,928 78			†76,395 01		642,478 95	16
260,810 99	44,299 27					305,110 26	17
644,003 97	375,649 66				48 52	1,019,702 15	18
5,701 17	1,220,248 58	441,287 64				e 1,771,115 65	19
0,958 74		72 00		89,879 49	7,254 27	360,050 38	20
4,327 58				361,120 42		386,322 18	21
16,324 51	7,107 98			2,362 54		f 75,588 51	22
96,909 71	173,781 51	4,056 84	681 99	1,452 02	19,270 34	394,623 47	23
						5,000 00	24
					91,055 60	91,055 60	25
48,151 42	48,151 42					96,302 84	26
				16,944 19		16,944 19	27
437 24					6,212 22	6,649 46	28
4,137,537 90	9,327,841 53	842,446 46	236,340 52	880,025 48	235,224 68	19,769,209 37	
27,356,324 37	39,019,673 46	6,802,036 18	2,984,828 03	5,454,207 09	300,861 51	124,656,743 32	

Folio 295.

been incurred.)
work.

of this Department, have been, in part, summarized by the Deputy Minister of Finance to be embodied

O. DIONNE,
Accountant.

EXPENDITURE ON ACCOUNT OF WORKS authorized by Special

Number.	Name of Work.	Amount Authorized.	Expenditure from 1st July, 1867, to 30th June, 1877.		1878.
			\$	cts.	\$ ts.
1	St. Lawrence River, deepening between Quebec and Montreal— 36 Vic., cap. 60.....\$1,500,000 00 45 do 44.....280,000 00	\$ 1,780,000 00	\$	cts.	IX. 130,000 00
2	Quebec Harbour Improvement— 36 Vic., cap. 62.....\$1,200,000 00 43 do 17.....250,000 00 45 do 47.....375,000 00	1,825,000 00	(a)723,000 00	IX.	75,000 00
3	Lévis Graving Dock— 38 Vic., cap. 56.....	500,000 00	.....	.....	.....
4	Esquimalt Graving Dock, B.C.— 37 Vic., cap. 17 } 43 do 15 }	250,000 00	.....	.....	.....
	Totals.....	4,355,000 00	1,581,000 00		205,000 00

(a) Exclusive of the sum of \$1,140, being amount of a cheque issued in 1873, and now cancelled.

E R R A T A .

Page.	Line or Item.		Instead of	Read
	From top of Page.	From bottom of Page.		
17	Item 16...	.....	1877. Quebec Post Office \$11,186 95	Montreal Post Office..... \$11,186 95
17	do 16...	.....	do 105,088 00	Quebec Post Office..... \$93,901 45
17	do 10...	.....	Montreal Post Office 460,426 38	Montreal Post Office 471,613 33
21	do 2...	.....	1877. Fort Pelly Barracks..... 15,000 00	Buildings at Fort MacLeod, &c.
38	do 5...	.....	Chicoutimi River, Saguenay Pier.....	Chicoutimi Pier, Saguenay River.
45	do 2...	11	1877. Chateauguay River... .. \$1,602 99	St. Francis River..... \$1,602 99
45	do 2...	11	Total. do 3,283 79	\$ 1,680 80.
45	do 11...	2	St. Francis River..... 14,218 51	15,821 50.
46	.....	1	\$2,000.00.....	2,400 00.
68	Item 7...	5	Salmon River.....	Thames River.
73	3rd line...	.....	1st July, 1870.....	15th July, 1870.
86	Item 14...	.....	\$460,426.38—1st Column.....	\$471,613 33.
87	do 14...	.....	\$490,593.36—Total do 501,780 31.	
88	do 27...	.....	\$105,088.46—1st and last Column.....	93,901 45.
88	do 2...	13	Belleville, Hastings East.....	Belleville, Hastings West.
108	do 7...	12	Belœil, County of Montmagny.....	Belœil, County of Verchères.
108	do 12...	7	Chenal du Moine, Yamaska.....	Chenal du Moine, Richelieu.
112	do 35...	.....	Presqu'Isle, Georgian Bay.....	Presqu'Isle, Lake Ontario.
112	do 35...	.....	do County of Grey.....	do East Northumberland.
112	do 43...	.....	Trenton, County of Hastings.....	Trenton do
117	do 3...	.....	Total. Chateauguay River..... \$3,283 79	Total. \$1,680 80.
117	do 18...	.....	St. Francis River..... 14,218 51	15,821 50.
138	do 11...	.....	Salmon River.....	Thames River.

Acts of Parliament, from 1st July, 1867, to 30th June, 1882.

Year ended 30th June.								Total for 15 years ended 30th June, 1882.	Number.
1879.		1880.		1881.		1882.			
	\$ cts.		\$ cts.		\$ cts.		\$ cts.	\$ cts.	
XIII.	178,000 00	XVII.	140,000 00	.....	.....	XIX.	194,000 00	1,500,000 00	
XIII.	150,000 00	XVII.	200,000 00	XVII.	202,000 00	XIX.	55,000 00	1,405,000 00	
XIII.	50,000 00	XVII.	75,000 00	XVII.	175,000 00	XIX.	50,000 00	350,000 00	3
.....	.....	.....	.....	XVII.	9,891 00	XXIII	37,769 22	47,660 22	4
	378,000 00		415,000 00		386,891 00		336,769 22	3,302,660 22	

APPENDIX No. 2.

REPORT ON PUBLIC BUILDINGS

THROUGHOUT THE DOMINION.

BY THOMAS FULLER, CHIEF ARCHITECT,

CHIEF ARCHITECT'S OFFICE,
OTTAWA, 30th December, 1882.

SIR,—Pursuant to instructions contained in your letter of the 26th August, 1882, I have the honor to transmit a report descriptive of the several public buildings of the Dominion, and of other works which have come under the control of this office, embracing especially the period from the 1st July, 1867, to the 1st July, 1882.

I have the honor to be, Sir,
Your obedient servant,

THOS. FULLER,
Chief Architect.

F. H. ENNIS, Esq., Secretary,
Department of Public Works,
Ottawa.

PROVINCE OF NOVA SCOTIA.

HALIFAX.

DOMINION BUILDING.

This building occupies a frontage of 125 feet on both Cheapside and George streets and 55 feet on Hollis street and Bedford Row, and comprises basement, ground first and second floor.

The basement contains the heating apparatus; the Post Office Department occupies nearly one half of the building from ground floor upwards, the Custom long rooms and Collectors office take up the remaining portion of the ground floor and on the succeeding floors are the Inland Revenue, Receiver General's offices and Provincial Museum.

The walls are of cut stone and the roof of wood covered with slate.

The style of architecture is Renaissance simply treated and the favorable position of the building gives it prominence.

The building is heated by steam, and supplied with gas and water from the city services.

Architect Mr. D. Stirling

PENITENTIARY.

This prison was transferred to the Dominion by the Provincial Government of Nova Scotia at the Union.

The building and yard cover a superficial area of 2,423 square yards. The prison consists of ninety cells in three ranges of thirty each, with administrative offices, dining hall, Warden's quarters, etc., attached.

The blacksmiths' shop, tailors' shop and carpenters' shop and a warehouse and store room are in the yard and are constructed of wood.

The building ceased to be used for penitentiary purposes on the transfer of the prisoners to the Maritime Penitentiary at Dorchester, N. B., and was proclaimed by Order in Council to be no longer a penitentiary.

DRILL SHED.

There is an Infantry drill shed 110 feet by 58 feet, an artillery drill shed 8 feet by 58 feet, and five armories which together are 26 feet by 54 feet, all in good condition and situated on a lot 232 feet by 152 feet, fronting on Spring Garden Road.

LAWLOR'S ISLAND QUARANTINE STATION.

This station is near the entrance of the harbour, about four miles from the City of Halifax.

This Island is 147 acres in extent, partly wooded and is easily accessible by boat being about 200 yards from the east shore.

The Island is divided into three districts, the sick, the convalescent and the healthy.

The buildings are of wood on stone foundations, and comprise two hospitals each 40 feet by 20 feet, one store shed 30 feet by 20 feet, a steward's residence, outbuildings, etc.

The wharf is of wood.

PICTOU.

CUSTOM HOUSE.

This building is situated at the steamboat landing on the Pictou side of the Pictou Extension Railway. Contract for construction was entered into during 1874-75, and completed and the building occupied in 1876-77.

It covers an area of 2,750 square feet and is three stories in height.

The external walls are brick with stone dressings, on stone foundations, and the roof is of wood.

Basement is appropriated for tide waiters room and water closets, the ground floor for Customs long room, Collector's office, Locker's room, and Weights and Measures offices, and the first floor shipping office and Inland Revenue offices.

Building heated by stoves.

Architects, Messrs. Stirling & Dewar.

QUARANTINE STATION.

Is situated on Pictou Harbour, on a lot known as the Marine Hospital and Quarantine grounds, and is 35 acres in extent.

It consists of a two storey hospital, 40 feet by 70 feet, and a steward's house, both of wood, also a one storey pest house of stone, consisting of a ward and a nurses' room.

LUNENBURG MARINE HOSPITAL.

In 1878-79 a plot of land, two acres in extent was acquired facing Lunenburg Harbour, and fronting roads to Battery Point and Blue Rocks, the construction of the building commenced in the same year and completed in 1880-81.

The hospital is on the cottage principle, and is constructed of wood on a stone foundation.

The wards are one story in height and the house steward's residence two stories. The place is L shaped, with the residence at the angle. and has two wards, one containing six beds and the other four; heated by stoves; plans and specifications prepared by this Department.

DRILL SHED.

A wooden building, 90 feet by 45 feet, situated on a lot bounded on the north by Townsend street, on the east by Hopson street and the south by Cumberland street, and is in a good state of preservation.

SYDNEY.

MARINE HOSPITAL.

The building is situated at Battery Point and covers an area of 2,200 superficial feet, is constructed of wood on a stone foundation, with a cellar under. It is L shaped and affords accommodation, in one wing for the administrative portion, and in the other an hospital ward for twenty patients.

Heated by stoves.

Plans and specifications prepared by this Department.

YARMOUTH.

BUKER'S ISLAND QUARANTINE STATION AND MARINE HOSPITAL.

Bunker's Island has a superficial area of 32 acres, and has no buildings except those existing at time of purchase.

There is a steward's house of wood, one and a-half stories in height, with two rooms on each floor. It was built forty years since and is in a dilapidated condition. There is also a good frame barn.

BELLTOWN, (COUNTY OF KING'S.)

DRILL SHED.

A wooden shed, 90 feet by 45 feet, situated on one-quarter acre lot, the property of the Dominion Government.

Building in a poor state of repair.

WINDSOR (HANTS COUNTY).

DRILL SHED.

Shed 120 feet by 50 feet including an armoury, situated on the road leading to Fort Edward, and is in a fair condition excepting the roof, which requires repairs.

RIVER PHILIP (CUMBERLAND COUNTY).

DRILL SHED.

A wooden building, 75 feet by 40 feet.

AMHERST (CUMBERLAND COUNTY).

DRILL SHED.

A wooden building 80 feet by 45 feet, situated on a lot 100 feet by 60 feet, on Prince Arthur street; built in 1872, and now dilapidated.

MACCAN AND RIVER HEBERT (CUMBERLAND COUNTY).

DRILL SHED.

Shed, 80 feet by 40 feet, situated at the corner formed by roads from Maccan Station, Joggins Mines, Lower Cove, Harrowfield and River Hebert. Building in need of repairs.

PROVINCE OF PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

DOMINION BUILDING.

This building is in the public square facing Richmond street and flanked by Market street on the right, and the Provincial Parliament House (Colonial Building) on the left, having Grafton street in rear. It covers an area of 5,560 square feet and consists of a basement, ground, first and second floor. The basement is devoted to heating service and caretakers' room, the ground floor to the Post Office and Savings Bank, the first and second floor to the Custom House and keepers' apartments.

The walls are of brick, covered with mastic and on a stone foundation, and the floors and roof are of wood.

Previous to the union of Prince Edward Island with the Dominion, this building was occupied by the Government of that Province.

Heating is by steam. Gas is supplied from the City service.

DRILL SHED.

A wooden shed 180 feet by 60 feet, with an armoury 75 feet by 20 feet, situated on Kent and West Streets, and in a good condition.

QUARANTINE STATION.

This depot is situated at Southport, and consists of a single $1\frac{1}{2}$ storey wooden building with stone foundations. There is a parlour, a small ward, and a kitchen on the ground floor; in the attic there are two wards, and a keeper's bedroom.

Heated by stoves.

GEORGETOWN.

DRILL SHED.

A wooden building, 80 feet by 40 feet, requiring repairs.

SOURIS.

MARINE HOSPITAL.

A site was purchased to the north of the town and the hospital erected during 1875-76.

The building is of wood. The main floor contains nurses' rooms, a kitchen, a scullery, a larder, a pantry, an entrance hall, and a ward for eight beds. On the first floor are three bedrooms.

Warmed by stoves.

Drawings prepared by this Department.

PROVINCE OF NEW BRUNSWICK.

FREDERICTON.

POST OFFICE.

This building has been erected upon ordnance property at the corner of Queen and Carleton Streets.

Works were commenced during 1878-79 and the building was completed and occupied in 1880-81.

The external walls are of brick with stone dressings, on a foundation of stone; internal walls of brick and wood.

The building consists of basement, ground, first and attic floors.

The basement contains furnaces, fuel and store rooms. The ground floor is occupied as a Post Office, the first floor as Custom House and Inland Revenue Offices, and the attic floor as caretakers' apartments.

The Weights and Measures Offices and the Examining Warehouse are in a detached one storey building in rear.

The main building is warmed by hot air furnaces.

Water supply from well in basement.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. D. E. Dunham.

STONE BARRACKS.

A group of buildings situated between Queen Street and the River St. John, which were transferred to the Dominion Government by the War Department on the 9th March, 1871, and comprising the following, viz.:

1. *Officers' Quarters*.—A stone three storey building, 93 feet 6 inches by 35 feet, with a slate roof, and a verandah on the west side the entire height of the front, built to accommodate 10 officers and now considerably out of repair. Attached to this are offices and stores and in connection with it various detached outbuildings.

2. *Soldiers' Barracks*.—A stone three storey building, 161 feet by 28 feet, with slated roof, and a verandah on one side the entire length and height of the building, now slightly out of repair. Built to accommodate 192 men.

3—*Guard House*.—A one storey stone building 40 feet square, with a wooden roof.

4—*Armoury*.—A wooden two storey building, 36 feet by 22 feet.

PARK BARRACKS.

This was transferred to the Dominion Government by the War Department 9th March, 1871, and is situated on the corner of George and Regent streets, comprising the following, viz.:

1—*Soldiers' Barracks*.—A wooden two storey building, 113 feet by 31 feet.

2—*Guard House*.—A wooden one storey building, 26 feet by 20 feet, and in need of repair.

3—*Officers' Quarters*.—Thirty-seven feet by 22 feet, now in fair condition.

4—*Magazine*.—A one storey stone bomb-proof building, 24 feet square, and somewhat out of repair; adjacent to this is a sifting room, 8 feet 4 inches square, of brick, with slate roof and stone steps, and in good condition.

In addition to the above there are the following buildings, now much dilapidated

5—*Gun Shed*.

6—*Engine House*.

7—*Cook House*.

8—*Artillery Quarters*.

Also wood shed, latrines, ball alley, &c.

ST. JOHN.

CUSTOM HOUSE.

The building formerly used as a Custom House which was destroyed by fire 20th June, 1877, was situated on a lot of land between Prince William Street, Water Street and Murder Hill. It was commenced in 1840 and occupied in 1842, and was originally a private enterprise, but was finally purchased by the Dominion Government on the 4th February, 1870.

Instructions were issued for the construction of a new Custom House on the original site in August, 1877, and contracts for the foundations immediately entered into; and in the following year contracts for the superstructure; and the building completed and occupied in 1880–81.

The frontages on Prince William and Water Streets are 200 feet each, and on Murder Hill ninety feet. The style is classic in character. The elevations on Prince William and Water Streets are three and four stories in height respectively with mansard roof.

The elevation on Prince William Street is relieved by slightly projecting central and pavilion. The sky line of this elevation is broken by a central dome and the roofs.

The Water Street elevation has a central and two end projections, giving the plan of building the form of a letter E, the central projection being carried one storey higher.

The foundations are of granite, and the walls above are faced with native sand stone in ashlar, the various heights of floors being marked by moulded strings and cornices.

The projections on Prince William Street contain the entrance. On this facade the pilasters which divide the wall surface into bays are carried from the ground level to the underside of main cornice in three orders.

The main doorway is boldly treated, being carried up through two stories.

The windows generally have moulded imposts and archivolts, with carved keystone. Each end elevation has a square tower, placed at junction of higher and lower—level roofs, the lines of which are carried up to a height of 120 feet, finished with balconies, on one of which is a signal apparatus, and on the other a time ball.

The frame of roof is iron with wood sheathing, the slopes covered with slates and the decks with asphaltum.

The sub-basement is occupied by heating apparatus, fuel, dredge-warehouse, stores, etc.; the upper basement by tide-waiters', appraisers' rooms and sailors' hall.

On ground floor are the Customs long room, Collector of Customs and staff, Clearance offices, Weights and Measures rooms, Excise, Agriculture and Steamboat Inspection, the first floor containing Marine and Fisheries, Public Works and Gas Inspection, and in attic are the apartments of caretaker, etc.

The building is divided into three sections, separated by brick walls reaching from foundation to roof.

Safes of brick are constructed for the use of the various Departments occupying the building. Heating is by steam; gas and water supplied by the city services.

Local Architects—McKean and Fairweather.

POST OFFICE.

In 1872 a lot of land was acquired, 50 ft. 6 in. by 90 ft., facing on Prince William, Princess and Water streets, and adjoining the property of the Bank of New Brunswick, and a Post Office erected thereon which covered the entire plot.

Its construction was commenced in 1871-72 and completed and the building occupied in 1875-76.

The style adopted was Italian; the outer walls facing on streets were of stone and the remaining walls brick. It consisted of a sub-basement, basement, ground, first, second and attic floors, all occupied by the local Post Office. Local Architect, Mr. M. Stead.

The above building was destroyed by the great fire of St. John, on the 20th June, 1877, and immediate steps were taken to replace it by a new building on the original site.

Contracts were entered into for this work in 1877-78 and the building completed and occupied in 1880-81.

The plans of the burned building, being considered suitable, were but slightly altered, the elevations being somewhat varied from the original ones, but the same character retained.

The external walls are of the same material as those of the original structure.

The floors are of iron joisting with brick arches between, levelled up with concrete and covered with wood. The internal walls are of brick, and the roof of wood covered with galvanized iron and slates.

The style is Classic in character, the walling above basement is faced with ashlar; moulded cornices divide the various stories, that beneath the attic having elaborate brackets, medallions and panels. The principal entrance is on Prince William street front, the centre of which projects slightly and contains three doors for public entrances to Post Office.

Above this entrance the wall is divided by pilasters and crowned by an ornamental clock pediment relieving the roof.

Building heated by steam. Gas and water supplied from the city services.

Architect, Mr. M. Stead.

SAVINGS BANK.

This building is situated on a lot 100 feet by 55 feet, at the intersection of Princess and Canterbury streets, which was the site of the previous building destroyed by fire on 20th June, 1877.

The contract work was commenced in 1878-79 and completed, and the building occupied in the year following.

The building is 50 feet by 41 feet; the walls fronting on streets are of stone with brick backing and the remaining walls are of brick.

The architectural treatment is Italian in character. The walling is coursed ashlar on a rock faced basement. The main fronts are divided into bays by pilasters in two orders, the lower, which is Corinthian, extends through ground and first floors, the upper is composite with appropriate strings entablature and balustrading.

The roof is of wood covered with asphaltum.

The basement contains the caretaker's living rooms and accommodation for the heating apparatus. On the ground floor are the Manager's rooms, banking room, and a large vault; on first and second floors are the remaining offices.

Heating by steam. Gas and water supplied from the city services.

Local Architects, Messrs. McKean and Fairweather.

MARINE HOSPITAL.

This building is in course of erection in the grounds connected with the present Marine Hospital, a dilapidated wooden structure, which it is intended to replace.

The portions under contract are the administrative block, having basement, two storeys and attic, and one ward of two storeys and a basement. The foundations are stone, the walls brick and the floor and roof wood; the roof being covered with slates on slopes and galvanized iron on flats.

In the basement will be a boiler room, a fuel cellar, a kitchen, a larder, a pantry storage baths, etc. The ground floor is to have a waiting-room, a surgery, convalescents' dining and sitting rooms, nurses rooms and a ward 28 feet by 48 feet; the second floor is to contain surgeon's, matron's, steward's and nurse's rooms and a ward similar to that on ground floor. The attic will be devoted to bedrooms, etc.

The plans admit of the addition of two extra wards, making, when complete: T shaped plan.

Architect, Mr. D. E. Dunham.

PENITENTIARY.

Originally this was used as a prison by the City of St. John and later by the Government of New Brunswick; at the Union of the Provinces it became the property of the Dominion Government, by which it was used as a Penitentiary for New Brunswick, and on the erection and occupation of the Maritime Penitentiary at Dorchester, N. B., it ceased to be a penitentiary.

It is situated about two miles from the City of St. John, on the opposite side of Courtenay Bay.

The inclosure is 821 feet long (east to west) and 454 feet wide (north to south) containing about nine acres. The fence is of wood and in a dilapidated condition.

The prison proper is 120 feet long by 44 wide, and 32 feet in height to eave with walls of granite and roof of wood covered with slates. It contains ninety cells in three tiers of thirty. The cells are placed back to back, 15 on each side on the three storeys, and the whole surrounded by a corridor, communication being had by galleries and staircases. The cells are of granite, and the floors, galleries and gallery stairs of wood. The floors, galleries and staircases are much worn. Attached to this building is a wooden storehouse 44 feet by 28 feet, shingled externally.

In the rear and at right angles to the granite prison building, to which is connected by a two story passage, is the female prison, a brick two storey building 108 feet by 43 feet with a slated roof, and containing two tiers of brick cells, twenty each tier with the Matrons quarters. It is in good condition.

The workshop is 103 feet by 28 feet, and three storeys and abasement in height. It is of brick with wood floors, and covered with a wooden flat gravelled roof.

The basement was used as an engine room, and the remainder for workshops; with a lean-to boiler house in rear 36 feet by 14 feet.

The Warden's quarters are in a building having basement, two full storeys, and attics, it is 33 feet 6 inches by 37 feet, has brick walls and wooden floors, and wooden roof covered with slates. The building is in fair condition.

Adjoining the Warden's quarters, in a row of 6 tenements, are the guards dwellings 93 feet four inches long by 32 feet wide, they are of brick, two storeys in height with flat gravelled roof, and are in a good state of preservation.

There is a wooden barn adjacent to the prison building, 78 feet by 30, which is in a serviceable state.

The porter's lodge at entrance to inclosure is a one story wooden cottage, 23 feet by 20 feet 6 inches.

The dryhouses, latrines, guards outlooks, etc., are wooden buildings, much dilapidated.

MILITARY BUILDINGS, LOWER COVE.

1. *Store Building and Offices*.—This has a frontage of 103 feet on Sydney street by a depth of 38 feet, its external walls are of grey and red sandstone with granite quoins to angles and openings. There are two storeys with wooden floors and roof. The resident officer in charge of the military stores has his quarters in the southern end.

2. *Officers' Quarters*.—A freestone building 140 feet by 40 feet.

3. *Soldiers' Barracks*.—Two wooden two storey buildings on stone foundations, one 300 feet by 35, and the other 180 feet by 38 feet.

4. *Hospital*.—A main building 35 feet square with an annexe 18 feet by 40 feet.

5. *Recreation Room*.—70 feet by 30 feet.

6. *Troopers' Stables*.—In two parts, one 75 feet by 25 feet, and the other 90 feet by 25 feet.

7. *Officers' Stables*.—30 feet square.

8. *Armourer's Shop and Gate House*.—65 feet by 20 feet.

9. *Commissariat Offices*.—30 feet by 35 feet.

10. *Gun Sheds*.—Two in number, one 120 feet by 30 feet, and the other 110 feet by 25 feet.

11. *Queen's Stores*.—100 feet by 40 feet.

12. *Store Building*.—100 feet by 20 feet.

13. *Guard Room*.—40 feet square.

14. *Orderly Room*.—30 feet square.

15. *Brick Magazine*.—19 feet by 10 feet, now in a good state of preservation.

16. *Expense Magazine*.—A wooden building covered with zinc, 13 feet by 10 feet, tolerably well preserved.

17. *Side Arms Shed*.—A wooden building 21 feet by 10 feet. Dilapidated.

18. *No. 3 Shed*.—A wooden structure, 12 feet by 6 feet, and in a good state of preservation.

The above were transferred by the Imperial authorities to the Dominion Government on 20th June, 1872.

During the great fire of St. John, 20th June, 1877, Nos. 2 to 14, inclusive, together with latrines, ablution rooms, lock up, and various other small wooden structures not enumerated above, were burned.

19. *Drill Shed*.—This building, which was erected in 1879, is of wood, on a stone foundation, with a gambrel roof, the upper slopes of which are covered with gravel and the lower with slate; it is 200 feet in length by 80 feet in width. On the northern side is the caretaker's quarters, 24 feet square, one storey in height. In the rear is a lean-to, containing twelve compartments, 8 feet by 16 feet each, for armouries.

MILITARY BUILDINGS, FORT HOWE, PORTLAND.

1. *Stone Magazine*.—This is of stone, with roof covering of slate; it is 54 feet by 7 feet, and 22 feet from ground line to apex of roof, the length being exclusive of

porches at both ends, each of which projects 3 feet, and the width exclusive of buttresses, three on each side, 4 feet wide, with a projection of 4 feet 5 inches.

The building is in a good state of preservation. Adjacent to it is a wooden filling shed 10 feet by 10 feet 6 inches. The yard is enclosed by a split cedar palisade, which is in good order.

2. *Brick Magazine*.—A brick building, 60 feet by 23 feet and 12 feet high, with a low pitch roof, covered with gravel, and having at one end a wooden porch covered with zinc. It stands parallel and adjacent to the last described. State of preservation good.

3. *Caretaker's Quarters*.—A wooden one storey building, 16 feet square, of one room, with lean to sheds on two sides and a small porch; now in a bad state of repair.

MARTELLO TOWER, CARLETON HEIGHTS.

This is a circular building, 30 feet in height and 50 feet in diameter at base, situated on Charlotte street, east of its junction with St. John street. The wall is of granite boulders, laid in mortar, three stages in height, viz., a stone vault resting on the wall and on a central stone pier; above is a bomb proof chamber having two gun-ports and one doorway with a vaulted brick ceiling which springs from the wall and from a central brick pier; a temporary flat roof rests on the parapet of gun deck and is a protection from the weather. The whole is in an excellent state of preservation.

PARTRIDGE ISLAND QUARANTINE STATION.

A new signal station was erected on the Island during 1872-73, which commands a view of the Bay of Fundy for many miles and communicates with the station at the Custom House in the city of St. John.

All the quarantine buildings, fencing and wharf are of wood and have from time to time received slight and essential repairs.

Heating by stoves.

DORCHESTER.

PENITENTIARY FOR THE MARITIME PROVINCES.

It having been decided to close the Provincial Penitentiaries throughout the Maritime Provinces, and erect a General Penitentiary in some central locality, Dorchester in the County of Westmoreland, N. B., was selected, and a site containing 619 acres of land was purchased within three-fourths of a mile from Dorchester Corner, on the road to Memramcook.

A contract was entered into on 3rd October, 1876, for the construction of a cell wing, the guard's hall, and the administrative block, the latter for the official staff of the prison; the building being planned to allow the addition of two cell wings when required, which will radiate from the guards' hall.

The external walls of building and the cells throughout are of stone and the partition walls brick, floors of cell wing, boiler house and guards' hall are stone, and the remainder wood; the roofs are of wood, covered on slopes with slates and galvanized iron on decks.

The basement has kitchen, offices for Deputy Warden, Matron and prison cellage, dungeons, baths, fumigating closets, boiler house, &c.

On the ground floor are the Warden's, Deputy Warden's, Accountant's, Surgeon's, Chief Keeper's and Storekeeper's offices, guard room, Deputy Warden's quarters, Guard hall (now used as a dining room) and cells. On the first floor are the Deputy Warden and Matron's quarters and two chapels (with Chaplain's room) for Church of England and Church of Rome; on the second floor are the female cells, storage, &c. There are 120 cells in four tiers, thirty in each tier, placed back to back with corridors ten feet wide on each side and end, directly lighted from the outside walls. The upper

tiers having galleries projecting from face of cell, which are continued around the Guards' hall, and communicate with the chapels, and are reached by staircases.

The Guards' hall is 40 feet by 60 feet, and 64 feet high exclusive of the lantern in roof.

The administrative block is 116 feet in length, by 102 feet in depth, the cell wing and Guards' hall are together 140 feet long, the cell wing being 48 feet in width, and the Guards' hall 64 feet.

The above was completed and occupied as a prison in 1878-79. The water supplied by the well sunk during the progress of the building having been found unsuitable for domestic purposes, an abundant supply was obtained from a spring about $1\frac{1}{2}$ miles distant from the prison.

A large tank and tank-house were constructed at the source of the spring and the water carried to the penitentiary by a 6 inch cast-iron pipe, from which it was distributed to the prison, the buildings in yard and the residence of the various officers.

A plot of land, 17 acres in extent, immediately surrounding the penitentiary, was enclosed by a picket fence or palisade (of logs) 14 feet in height, with guard's look-out, towers and platforms at angles and at entrance gate.

The water service, the fence and the present system of drainage have been principally executed by convict labour.

The wooden building used as a farm house before the property was acquired by the Government, was repaired and altered for the residence of the Warden.

In 1880-81 a contract was entered into for the construction of 15 double cottages for guards' dwellings, a workshop, a bake-house, a laundry, an hospital, an ice-house and four root-houses, all constructed of wood, with the exception of the cottages and root-houses, these are all on stone foundations.

Each guard's cottage contains on the ground floor a parlour, a kitchen and a scullery, on the first floor three, and in the attic two, bedrooms. The laundry has a wash room a drying room and an ironing room on ground floor, with mending rooms over.

The hospital consists of two wards of ten beds each, and kitchen, dispensary, surgeon's and nurses' rooms.

The present accommodations for prisoners having been found inadequate, a contract was entered into on 23rd November, 1880, for an additional cell wing, similar in construction and materials to the former one, and to contain 200 cells; also a detached boiler house.

Plans, etc., prepared by this Department.

ST. ANDREW'S.

FORT TIPPERARY.

This fort with appurtenances was transferred to the Dominion Government, 9th March, 1871.

The buildings comprise the following, viz.:—

1. *Magazine.*
2. *Barracks.*
3. *Sergeants' Barracks.*
4. *Store.*
5. *Kitchen.*
6. *Outbuildings, &c.*

In addition to Fort Tipperary, and on the same date, *West Point Block House* and *Boe's Point Block House* were transferred to the Dominion Government.

MARINE HOSPITAL.

In 1872-73 a contract was entered into for the erection of an hospital, to replace the former one which had been destroyed by fire, and was completed in 1873-74.

It is built of wood on a stone foundation and has accommodation for 24 patients, and rooms for staff in charge. Heating by stoves.
Architects, Messrs. Stirling and Dewar.

DRILL SHED.

A one and a-half storey building, 40 feet by 30, on Block 2, part of Public Square intersected by Water street.

CHATHAM.

POST-OFFICE, CUSTOM HOUSE, ETC.

This building was acquired in 1872-73 and altered to adapt it to the use of Postal Customs and Inland Revenue local services.

It is a two storey and a-half building of stone, roofed with wood covered with slate, and is situated centrally on south side of Water street.

The Post Office is on the main floor, and the Custom House and Inland Revenue on the floor above.

It is heated by stoves. Plans, etc., for alterations prepared by this Department

MIDDLE ISLAND QUARANTINE STATION.

This station, which is situated about two miles below the town of Chatham, on the Miramichi, is 78 acres in extent, and is easy of access from the main shore. There is an hospital 21 ft. by 24 ft., and a Caretaker's dwelling 27 ft. by 33 ft., the latter two storeys in height; both buildings are of wood on stone foundations.

Buildings warmed by stoves. Plans and specifications prepared by this Department.

MIRAMICHI.

MARINE HOSPITAL.

A 1½-storey building, measuring 40 ft. by 100 ft., situated at Douglastown between and parallel to the Newcastle road and Miramichi River.

The walls and chimneys are of sandstone and the roof of wood. The ground floor contains two wards, an hospital parlour, a wash-room, a kitchen and a pantry in the attic are the caretaker's quarters.

Heating by stoves.

NEWCASTLE.

CUSTOM HOUSE.

A stone building, 30 ft. by 30 ft., covered with slate, formerly used as a Custom House, was purchased by the Dominion Government in 1872-73, and various slight alterations and repairs effected to make it suitable for Customs Department.

Warming by stoves.

SACKVILLE.

MARINE HOSPITAL.

This depot consists of an hospital (originally a dwelling house) and seven acres of land, the latter a part of Lot No. 31, Palmer's Plain. It was acquired in 1871. Heating by stoves.

PROVINCE OF QUEBEC.

QUEBEC,

CITADEL.

The following buildings, together with appurtenances, &c., were delivered over by the Imperial authorities to the charge of the Dominion Government on the second of December, 1871.

1. *Officers' Quarters*.—A stone building, 340 feet by 50 feet, two storeys and basement, with wooden floors and roof, the latter covered with tin; the first floor being ceiled with bomb-proof arches; accommodation for 37 officers; in a fair state of preservation.

2. *Manns Barracks*.—A stone, two storey building, with tin covered roof; size 125 feet by 40 feet, having on the first flat a reading room and librarian's quarters, and on the second flat a school room and quarters for 35 men.

3. *Manns Store and Shot Shed*.—A stone two storey building; roof covered with tin; size 125 feet by 40 feet.

4. *Armoury and Gun Carriage Store*.—A stone two storey building with tin covered roof; size, 180 feet by 40 feet.

5. *Hospital (infection)*.—A wooden building on a stone foundation, two stories in height, with tin covered roof. The lower flat is the steward's quarters, and the upper the female hospital. Size, 40 feet by 20 feet.

6. *Hospital (bomb proof)*.—A stone building, two stories in height, with roof covering of tin; accommodation for 14 patients, hospital, sergeant's quarters, surgery and kitchen. Size, 120 feet by 40 feet.

Attached is a stone one story dead house with tin roof covering.

7. *Military Store or Cavalier*.—A stone two story building with tin covering to roof; size, 230 feet by 40 feet.

8. *Magazine A*.—A stone one storey building with roof covering of tin; size, 100 feet by 60 feet; capacity, 4,610 barrels.

9. *Magazine B*.—Is one story, of stone, with tin covering to roof; 60 feet by 40 feet; capacity, 2,388 barrels.

10. *Old Provost Prison and Staff Sergeant's Quarters*.—A stone building with tin covering to roof, 50 feet by 60 feet, having 4 cells and quarters for 3 staff sergeants.

11. *Officers' Stables*.—80 feet by 20 feet, a stone building, one story and hay loft, with tin roof covering; accommodation for 10 horses and harness rooms at ends of stables.

12. *Observatory*.—A stone two story building, (with a tin roof,) 20 feet square, having time ball, &c.

13. *Defensible Guard Houses*.—Four in number; (1) one at South Ravelin, (2) one at West Ravelin, (3) one at North Ravelin and (4) one at King's Bastion.

14. *Artillery Store Shed*.—A wooden building, one storey, with tin roof covering, 10 feet by 20 feet.

15. *Casemates*.—These are situated in Dalhousie and Richmond bastions numbering from 1 to 9 and having a capacity for 702 rank and file, they are of stone, one storey and bomb-proof.

16. *Engine House*.—A stone one storey building with tin roof covering. Size 30 feet by 18 feet.

17. *Stable and Coach House*.—A wooden one storey building with accommodation for 5 horses.

18. *Armourers Shop*.—A stone one storey building, 15 feet by 20 feet with a tin covered roof.

19. *Tenille*.—Between Diamond and Dalhousie Bastions. It is a one storey bomb-proof building 170 feet by 20 feet with quarters for 8 staff sergeants.

20. *Casemated Stores*.—A stone building 150 feet by 30 feet.

21. *Drill Shed*.—A wooden building 80 feet by 22 feet with roof covering of tin.
22. *Ablution and Wash House*.—A wooden building, 40 feet by 25 feet one storey and basement, and with tin covering roof.
23. *Artillery Stores*.—A stone two storey building 20 feet by 15 feet with tin roof covering.
24. *Ablution House*.—A stone one storey building, 40 feet by 15 feet, with roof covering of tin.
25. *Wash House and Sergeants' Mess Kitchen*.—A one storey wood and brick building, 40 feet by 15 feet, with tin roof covering.
26. *Casemates used as a Canteen*.—Stone bomb-proof compartments 50 feet by 35 feet.
27. *Jebb's Redoubt*.—Built of stone, two storeys, with accommodation for two officers, one staff sergeant and forty-seven men, and containing a cook-house and out-buildings.
28. *Artillery Casemates*.—One storey, stone, bomb proof, with accommodation for fifteen men.

In addition to the foregoing there are small magazines, one in each ravelin, latrines connected with the various outbuildings, fuel sheds, privies, &c.

Wells and Tanks.—Numbered one to thirteen with a total capacity of 586,093 gallons.

The condition of the casemates and walls of the Citadel was found to be such that in 1872-73 and following years, extensive repairs were made to prevent them from falling into utter ruin, and also to make the casemates fairly habitable. One of the most important works was the roofing of the casemates in wood which protects the walls and vaulting from rain and frost and provides a shed, for drill purposes, over.

A portion of the officers barracks, Citadel, was altered and made suitable for a summer residence for His Excellency the Governor-General.

A balcony or promenade was laid down in King's Bastion, behind the old officers stables &c., (No. 11 ante) and the latter having been removed a wooden reception room, 60 feet by 40 feet, was erected, using a part of the old wall as a foundation.

The reception room is on the first floor, communicating with the drawing-room of His Excellency's quarters, and the lower story is utilized for cloak room, water closets and men's bedrooms.

Stabling for His Excellency's horses has been provided in old storehouses between Mann's and Diamond Bastion's.

The wells and tanks of Citadel have been cleaned and the drains put in working order.

ARTILLERY BARRACKS.

This property, which was given over in charge of the Dominion Government by the Commandant R. E. in Canada, 2nd December, 1871, covers an area of 13 acres 3 roods and 2 perches.

1. *Officers', Married Soldiers' and Soldiers' Quarters*.—A stone building 31 feet by 40 feet, 2 storeys; basement and attic; roof covered with tin.
2. *Latrines*.—A brick $1\frac{1}{2}$ storey building, with tin-covered roof, 40 feet by 20 feet.
3. *Offices and Stores*.—Stone, 2 storeys and attic, 60 feet by 40 feet.
4. *Stores and Latrines*.—Wooden building.
5. *Store Shed and Cooperage*.—Stone, 1 story, roof covering tin, 120 by 20 feet.
6. *Work Shop*.—2 storeys, stone, with tin-covered roof; size, 99 feet by 20 feet.
7. *Cook-house*.—Of stone, 1 storey, with tin-covered roof; size, 36 feet by 20 feet.
8. *Latrines and Lavatories*.—One storey, stone and wood, roof covered with tin, 50 feet by 15 feet.
9. *Wash-house and Latrines*.—Stone and brick, 1 storey, roof covered with tin.
10. *Guard-room, lock-up, cells and Staff Sergeants' quarters*.—A stone, 2-storey and attic building, with tin covering to roof, 80 feet by 30 feet.

11. *Canteen, Officers' Mess, Officers' Quarters and Barrack Room*.—Stone building, with tin-covered roof, 3 stories and basement; size, 76 feet by 40 feet.
 12. *Mess kitchen, Sergeants' kitchens and Cooks' quarters*.—A stone 1 storey building, with tin-covered roof; 76 feet by 40 feet.
 13. *Billiard Room*.—Wooden building, one storey, attached to officers' quarters, 20 feet by 30 feet.
 14. *Gunners' Stores*.—A stone 1 storey building, roof covered with tin, 20 feet by 20 feet.
 15. *Gun shed*.—Of wood, 70 feet by 20, covered by a tin roof.
 16. *Coach house and loft*.—A wooden building 20 feet square, with tin roof covering.
 17. *Stables and coach house*.—Of stone, 40 feet by 20 feet, with tin roof covering.
 18. *Armourer's shop*.—A wooden building, 15 feet by 20 feet, one storey, with tin roof covering.
 19. *Fire engine house*.—Stone building, 18 feet by 20 feet, one storey in height, with sheet iron roof covering.
 20. *Artillery stables*.—Of wood, one storey, 70 feet by 20 feet, roof covered with shingles; accomodation for 25 horses.
 21. *Married officers' quarters*.—A stone building, one storey, 40 feet by 18 feet, with latrines attached, roof covered with tin.
 22. *Kitchen and married officers' quarters*.—A wooden one storey building, 18 feet square, with tin covered roof.
 23. *Stable and Fuel Shed*.—A wooden one storey building, 20 feet by 14 feet, roof covered with tin.
 24. *Coal Shed and Latrines*.—Wooden buildings, with a stone ash pit attached to former.
 25. *Stone Magazine D*.—Situated in Lower Park St. John Bastion. A stone one storey building, 45 feet by 30 feet, roof covered with tin.
 26. *Ordnance Stores*.—A stone building having a ground floor and attic, 220 feet by 37 feet, roof covered with tin..
 27. *Married Soldiers' Quarters, Glacis*.—A stone building, 157 feet 5 inches by 40 feet, having a detached wash house (of wood) 64 feet by 23 feet.
- The buildings above described, excepting Nos. 3, 4, 5, 21, 22, 23, 24, 25, 26 and 27, were converted into a cartridge factory during 1880-81 and 1881-82.

JESUIT BARRACKS, MARKET SQUARE.

Transferred to the Dominion Government by the War Department, 2nd December, 1871.

These premises, at the time of transfer, comprised a quadrangular barrack building, facing on Market Square, a bakery and fuel yard facing on St. Ann street, and various stone buildings, etc., as follows:

1. *Barrack Building*. A quadrangular building, 200 feet by 190 feet (enclosing court yard 135 feet by 115 feet); stone walls throughout and with tin roof covering.

The east wing was two storeys in height and accommodated two officers, four sergeants and 115 men.

The north wing had four storeys, basement and attic, with accommodation for one officer, five non-commissioned officers and 214 men.

In the south wing were two storeys, basement and attic, affording accommodation for one officer, one sergeant and 133 men. An extension of this wing, which was two storeys and attic in height; accommodated two sergeants and 138 men.

The west or rear wing was two storeys, a basement and an attic, and provided for two sergeants and 175 men.

The total barrack accommodation as above was for three officers, seventeen non-commissioned officers and 775 men.

2. *Cook-houses*. These were in rear of above and in a one storey stone building, the roof of which was covered with tin; size, 72 feet by 32 feet.

Attached to this and constructed of the same materials, was the wash-house, 33 feet by 36 feet.

3. *Coach house, Stables and Hayloft.* A one storey stone building in rear of barrack building; with tin roof covering; size 40 feet by 16 feet, stalls for four horses.

4. *Commissariat Meat Store.* A wooden building on a stone foundation, with wooden roof, and in the rear of the barracks; size 76 feet by 37 feet.

5. *Straw Store.*—A building adjoining and similar to the last described; size 77 feet by 37 feet.

6.—*Expense Magazine.*—On Market street, with a capacity of eighty barrels and 65,000 rounds.

The above, comprised in Nos. 1 to 6, inclusive, were demolished in 1878-79.

In addition to these are tanks Nos. 1 and 2, the former with a capacity of 127,600 gallons, and the latter a capacity of 5,477 gallons.

The following buildings are on the St. Anne street front:

7. *Bakery.*—A one storey and basement stone building, (with tin covered roof) 92 feet by 48 feet.

8. *Issuer's Quarters.*—Attached and similar to No. 7 in construction and number of storeys; size, 27 feet by 17 feet, with a wooden kitchen and fuel shed.

9. *Barrack Offices and Stores.*—A stone building, two storeys and basement, with a tin covered roof; size, 90 feet by 35 feet.

10. *Guard Room, Lockup and Armourer's Shop.*—Two one storey stone buildings one on each side of gateway, 25 feet by 40 feet, with roof covering of tin.

11. *Engine House.*—A one storey stone building, with a tin covered roof, to accommodate two fire engines; size, 18 feet by 13 feet.

OFFICERS' BARRACKS AND GARRISON HOSPITAL, MOUNT CARMEL.

These were transferred by the War Department to the charge of the Dominion Government, 2nd December, 1871.

1. *Officers' Barracks and Mess Kitchen.*—A stone building with two storeys and basement, and roof covered with tin, having accommodation for twelve officers; size 95 by 45 feet.

2. *Officers' Mess Room and Reading Room.*—Two storeys, of stone, roof covered with tin; size 54 feet by 30 feet.

Purveyors Stores Offices, etc.—Of stone, two storeys, 90 feet by 30 feet, roof covered with tin.

Attached to Nos. 1, 2 and 3 are latrines, ashpits, etc., etc.

4. *Garrison Hospital.*—Three storeys, basement and attic; a stone building with tin covering to roof; size 190 feet by 40 feet. The accommodation as follows: In basement, warming apparatus, kitchen and medical stores; on ground floor, surgery, library, staff sergeants' quarters; on first and second floor, in each, accommodation for fifty patients, staff sergeants' quarters, lavatories, etc., etc.

5. *Cook house.*—A one storey stone building with tin roof covering; 35 feet by 16 feet.

6. *Dead-house.*—A stone building 17 feet by 12 feet; one storey in height and with roof covering of tin.

7. *Guard-house.*—Of stone with tin covering to roof; one storey in height; size 16 feet by 22 feet.

In connection with Nos. 4, 5, and 7 there are latrines, straw stores and shed.

GUARD HOUSES, MAGAZINES AND FORTIFICATION WALLS.

These properties were transferred to the charge of the Dominion Government, 2nd December, 1871.

1. *Guard House, Carronade Battery.*—A stone one storey building, 30 feet square, with tin covered roof.

2. *Hope Gate, Guard House and Barracks.*—A two storey building, with tin covered roof; the lower storey (stone) consisted of an ablution room, a cook-house,

and a guard room; the upper storey (wood) accommodated a staff sergeant and thirty-seven men. It was demolished in 1874.

3. *Palace Gate Guard House*.—A stone building, with basement and ground floor; roof covered with tin. Occupied as a guard, and married soldiers' quarters; demolished in 1874.

4. *St. John's Gate Guard House*.—A stone one storey building, 25 feet by 15 feet, with a tin covered roof. It was demolished in 1881.

6. *Magazine "F," Grand Battery, also Ordnance Storehouse, &c.*—Magazine "F" is a stone building, 30 feet by 20 feet, covered with tin, having a capacity of 350 barrels; storehouse is 60 feet by 25 feet, two stories, with attic and basement.

7. *Grand Magazine "E," (Hotel Dieu)*.—Built of stone, roof covered with tin; 130 feet by 25 feet, with a capacity of 4,832 barrels.

8. *St. John's Gate*.—This was widened at the expense of City Corporation of Quebec; commenced 1863, completed 1867.

9. *Cooperage, Sifting Room and Artillery Store (Hotel Dieu)*.—Size, 20 by 15 feet.

10. *Magazine, Sifting Room, &c. (Esplanade)*.—A stone building, with roof covered with tin; size 40 feet by 25 feet.

KENT AND ST. LOUIS GATES.

During 1878-79 contracts were entered into for the erection of two new gates—one, St. Louis, on the site of the old gate of the same name, and the other connecting Nouvelle and Ursule streets, known as Kent Gate.

The architecture is castellated, adapted to harmonize as far as practicable with the fortification walls.

Each gateway consists of two archways, one over the roadway and one of footpaths, and the other over the remaining footpath.

The arches are stone, the hanches being filled with concrete, levelled up with asphaltum, and covered with wood-block pavement, forming with the ramparts of the fortification walls a continuous promenade.

The front and rear walls have embattled stone parapets corbelled outwards.

To each gate is a flight of stone steps from street to level of ramparts.

Each gate has a square stone tower with pyramidal roof over the smaller roadway, and stone circular corbelled turrets, two on St. Louis Gate and one on Kent Gate. A contribution by Her Majesty the Queen has been made towards the erection of the later, which is named after Edward, Duke of Kent.

The greater portion of the fortification walls have been put in a fair state of repair.

DUFFERIN TERRACE.

The Corporation of the City of Quebec having extended Durham Terrace along the wall above Champlain street to its termination under King's Bastion, on temporary wooden supports, the Dominion Government repaired the battery wall beneath and carried it upwards to terrace level, where it serves as a permanent support.

CHAMPLAIN STREET CLIFF.

Owing to the shaly nature of the rock exposure of Citadel Hill, on Champlain street, which, through the action of the weather, was loosened, and threatened to endanger the lives of those residing immediately below, it was considered advisable to obtain the properties in danger, and, having demolished the buildings, erect a retaining wall at foot of cliff. At the same time advantage was taken to widen the street at this point, where it was especially narrow, which prevents loose stones falling from the cliff, doing injury to property, passers or residents.

COMMISSARIAT PREMISES, ST. LOUIS STREET.

These were delivered to Dominion Government by the War Department on 2nd December, 1871.

1. *Commissariat Offices*.—A stone building two storeys and attic, 66 feet by 40 feet, with a wing in rear 45 feet by 24 feet.
2. *Engine House and Fuel Shed*.—A stone one storey building with tin roof covering, 65 feet by 25 feet.
3. *Stables*.—A stone one storey building with roof covered with tin, size 45 feet by 22 feet.

MILITARY PRISON, ST. LOUIS BASTION.

The charge of this property was transferred by the Imperial authorities to the Dominion Government on the 2nd December, 1871.

1. *Casemates of Bastion*.—Contains dormitories for 60 men, 6 cells, wash room and watch room.
2. *Chief Warder's Quarters*.—A stone building 50 feet by 25 feet, one storey and with tin roof covering.
3. *Warder's Quarters, Office and Store Room*.—A stone one storey building, 4 feet by 20 feet, with roof covered with tin.
4. *Warder's Quarters, Cook House, etc.*—A two storey and attic stone building, 5 feet by 30 feet, with roof covered by tin.
5. *Shot Shed*.—A wooden one storey building 100 feet by 18 feet, containing shot shed and accommodation for drilling prisoners. There is also a small shed in the rear for breaking stone, also privies, and a tank capable of containing 14,000 gallons of water.

ENGINEER'S YARD, ST. LOUIS STREET.

One of the properties delivered over to the charge of the Dominion Government by the Imperial authorities on 2nd December, 1871.

1. *Royal Engineer's Office*.—A stone building, 100 feet by 25 feet, one storey in height and with tin covering to roof.
2. *Office Keeper's Quarters*.—A stone building, 30 feet by 40 feet, with wooden roof.
3. *Carpenter's Shop*.—Wooden, on a stone foundation, 130 feet by 40 feet, roof covered with sheet iron.
4. *Old Stables*.—Of wood, 30 feet by 20 feet.
5. *Smith's Shop*.—A stone one storey building, 80 feet by 20 feet; roof covered with sheet iron.
6. *Tank*.—Capacity, 5, 803 gallons.

FULMINATE BUILDINGS, COVE FIELD.

A group of five detached one storey buildings, four of wood and one of brick (one with tin roof covering,) surrounded by a wooden fence, situated between the Laboratory Buildings and Martello Tower No. 1.

Erected in 1881-82.

SIFTING SHED.

A wooden one story building, adjoining the Fulminate Buildings; erected 1880-81.

LABORATORY BUILDINGS, COVE FIELD,

These are 10 in number, 8 of which are wood, one of stone and one of brick, seven have roofs covered with tin, one with lead, and two with shingles; these are detached one storey buildings; a number of these were transferred by the War Department in 1871 to the Dominion Government, which erected additional buildings and made alterations to those existing during 1880-81.

In connection with these is a wooden one storey Keepers' Cottage.

CLERK OF WORKS, QUARTERS, COVE FIELD.

This is a one storey wooden building, adjoining No. 2 Martello Tower, transferred in 1871 with the other War Department properties.

MARTELLO TOWERS.

These were transferred by the War Department to the charge of the Dominion Government in 1871, and comprise Nos. 1 and 2 between Grand Allee and Diamond Harbour, and Nos. 3 and 4 on upper and lower sides of St. John street.

They are circular, built of stone, three stages in height, the second stage having vaulted ceiling, which springs from the walls and from a central pier; the third stage is the gun deck and is roofed temporarily to protect the masonry from damage by the weather.

Nos. 1 and 4 are each 9,275 feet cube with a capacity for eight men. Nos. 2 and 3 are each 10,932 feet six inches cube and has a capacity for 10 men.

ARMOURY AND GUN SHED.

This structure has been fully described in the Report of the Commissioner of Public Works for 1867.

QUEEN'S WHARF BUILDINGS.

These are situated on Cul de Sac Street, between the old Custom House and the Champlain Market, and were transferred to the Dominion Government in 1870-71. They comprise the following, viz. :

1. *Queen's Stores, North and South Wings.*—A stone building, three storeys and cellar (the south wing having an attic in addition), 250 feet by 42 feet; now under the charge of the Marine Department Agency.

2. *Military Stores.*—A wooden one storey building, 150 feet by 39 feet, with a in covered roof, used by the Marine Department Agency as workshops.

3. *Cottage.*—One storey, of stone, 23 feet by 29 feet, having a sheet iron covering to roof, a wooden kitchen attached and now occupied by the store-keeper of the Marine Agency.

4. *Fuel Sheds, Latrines, &c.*

WATER POLICE STATION.

This building, which was fully described in the Report of the Commissioners of Public Works, 1867, is now occupied by the Marine Department Agency.

THE OLD CUSTOM HOUSE.

This building, which was fully described in the Report of the Commissioners of Public Works, 1867, is now in use for the following public purposes :

The Department of Marine and Fisheries occupies two rooms and the large store room on the upper storey as offices.

The Government Immigration Office also occupies two rooms on the upper story. The shipping master's office, two rooms on the ground floor, river police office, four rooms on ground floor and a lock-up in the basement.

The building is in fair preservation.

The wooden building on the wharf is partly used as a smithy and store house for the Government steam vessels, and a portion is divided off for the shelter of Immigrants.

CUSTOM HOUSE.

This building has been fully described in the report of the Commissioners of Public Works, 1867, since which date essential and ordinary repairs have been executed.

The attics have been recently converted into caretakers' quarters.

POST OFFICE.

In 1869-70 a plot of land on the corner of Buade and Dufort Streets, adjoining the old Post Office was acquired, with a view of facilitating the entrance and exit of the public to and from the building.

The construction of a new building was contracted for and commenced in 1870-71 and completed and occupied in 1872-73.

The building is 95 feet by 68 feet, three storeys and basement. The external walls are of grey cut limestone, interior walls of brick and roof of wood covered with tin.

The portion of the basement, which is excavated, is occupied by the caretaker and for heating apparatus.

On the ground floor is the Post Office proper.

The first floor contains the Post Office, Inspection Offices and the second floor is unfinished.

Warming is by hot water. Water and gas are supplied from the city services. Architect, Mr. P. Gauvreau.

MARINE HOSPITAL.

This building was fully described in the Report of the Commissioner of Public Works, 1867; repairs and renewals to keep the building in a good condition have been done, and a new system of drains has been laid down.

OBSERVATORY.

This building has been fully described in the Report of the Commissioner of Public Works, 1867.

The Director's residence, situated at Bonner's Hill, was erected during 1873-74. It is built of wood, 34 feet by 30 feet, on a stone foundation, is $2\frac{1}{2}$ storeys in height and has separate outbuildings for the accommodation of various instruments.

Warmed by stoves. Architect, Mr. P. Gauvreau.

IMMIGRANT SHED.

This building was fully reported upon in the Report of the Commissioner of Public Works, 1867, since which date it has received essential repairs only, and is now occupied as a smithy by the Marine Department Agency.

DRILL SHED.

This building was fully described in the Report of the Commissioner of Public Works, 1867.

LEVIS.

LEVIS FORTS.

Transferred by the War Department to the charge of the Dominion Government in 1871.

Fort No. 1.—A stone fort with 11 casemates for 12 men each.

Forts 2 No. and 3.—Brick casemated forts, each with same accommodation as No. 1.

ENGINEERS' CAMP.

Is situated on the road between the Government Wharf and Fort No. 1, and was surrendered by the War Department to the Dominion Government in 1871; the buildings are of wood, one storey in height, and comprise the following:

1. *Officers' Quarters and Kitchen*.—Size of officers' quarters, 140 feet by 25 feet, and of kitchen in rear, 95 feet by 25 feet.
 2. *Soldiers' Barracks*.—Four buildings; size of each, 120 feet by 20 feet.
 3. *Canteen*.—70 feet by 40 feet.
 4. *Offices*.—50 feet by 20 feet.
 5. *Workshops*.—There are two, size of one 140 feet by 25 feet, and of the other 45 feet square.
 6. *Cook House*.—55 feet by 20 feet.
 7. *N. C. Officers' Mess*.—50 feet by 20 feet.
 8. *Store House*.—50 feet by 17 feet.
 9. *Theatre*.—75 feet by 33 feet.
 10. *Hospitals*.—Two buildings, one 50 feet by 20 feet, and the other 28 feet by 20 feet.
 11. *Magazine*.—20 feet by 15 feet.
 12. *Guard House and Cells*.—50 feet by 20 feet.
 13. *Stables*.—35 feet by 30 feet.
 14. *Dead House*.—Fifteen feet by 10 feet.
 15. *Butcher*.—25 feet by 20 feet.
 16. *Wash House*.—30 feet by 10 feet.
- Also latrines, sheds, etc., etc.

SPRUCE CLIFF HOUSE.

This is a stone Villa, two storeys, basement and attic, situated on the road from the Levis Ferry to Fort No. 2.

TEMISCOUATA BARRACKS OR FORT INGAL.

This property was transferred by the Imperial Authorities to the Provincial Government of Canada in 1856.

CHICOUTIMI.

MARINE HOSPITAL.

This hospital is in course of construction on a plot outside and abutting on the town line at the rear of the college.

The basement walls are stone, those of the superstructure brick and the roof of wood. The administrative portion, which is central, consists of basement and two upper storeys, and the wards which are lateral of a basement and one upper story each. Plans, etc., prepared by this Department.

GROSSE ISLE.

QUARANTINE STATION.

This depot has been fully described in the Report of the Commissioner of Public Works 1867.

A residence for the medical superintendent and an extension to the pier were completed during 1871-72.

A contract was entered into in 1872-73, for the construction of boatmen's dwellings, two sheds, a Catholic chapel and an immigrant shed, all but the last named have been completed and occupied.

They are of wood on stone foundation, the dwellings being 114 feet long by 26 feet, the chapel 40 feet by 26 feet with a sacristy 14 feet by 12 feet, and a porch 7 feet by 8 feet, and the stables 22 feet by 32 feet and 24 feet by 20 feet respectively.

The hospitals at the eastern end of the Island were destroyed by fire on the 3rd September, 1878.

During 1881 a contract was made for an hospital to contain eighty patients, construction was commenced in the same year and finished in the year following.

It is located at the east end of the Island, is constructed of brick with hollow walls and is roofed with wood.

There are two wards on the ground floor, 60 feet by 25 feet each for twenty patients, also surgeon's room, nurses waiting room, kitchen, stores, pantry, living room, and convalescents' day room, and on the first floor two wards as on the ground floor, three bed rooms for staff, nurses room, day room, and rooms for linen, stores, etc.

Plans, etc., prepared by this Department.

THREE RIVERS.

OLD BARRACKS.

This building, with the military fuel yard, &c., were handed over to the Provincial Government of Canada by the War Department, in 1856.

A two storey and attic stone building with wooden floors and roof, 90 by 44 feet, with two wings, one 24 feet by 15 feet, and the other 18 feet by 15 feet.

During the present fiscal year and the preceding one, alterations have been carried on for the conversion of this building into a Custom House and Inland Revenue Offices.

Architect for alterations, Mr. O. Z. Hamel.

CUSTOM HOUSE AND INLAND REVENUE OFFICES.

It is erected on a portion of the Platon property facing Notre Dame street, and covering an area of 1,474 square feet.

The foundations and basement walls are of stone, and the remaining walls of brick; the roof is of wood.

It consists of a basement, first and attic floors, and contains an examining warehouse in basement, and on the first floor a Custom House and Inland Revenue offices.

Building heated by stoves. Architect, Mr. H. M. Perrault.

SOREL.

BARRACKS.

This property was handed over to the Provincial Government of Canada by the War Department, in 1856. It is now under lease to the Richelieu Company, to which the barrack buildings were sold, June, 1874.

1. *Expense Magazine* (formerly a windmill).—A circular stone building three storeys in height and 30 feet in diameter.

2. *Soldiers' Quarters*.—A wooden two storey building, 120 feet by 25 feet.

3. *Prison Cells*.—A brick one-storey building, 25 feet by 20 feet.

4. *Cook house*.—A brick one storey building, 30 feet by 20 feet.

The following Nos. 5 to 13, are one storey wooden buildings.

5. *Soldiers Barracks*.—Two buildings, one 110 feet by 25 feet, and the other 40 feet by 25 feet.

6. *Offices, etc.*.—A building 40 feet by 25 feet.

7. *Soldiers' Quarters*.—A building, 100 feet by 30 feet.

8. *Engine House and Commissariat Store*.—A building, 50 feet by 20 feet.

9. *Cook-House*.—A building, 30 feet by 25 feet.

10. *Guard-Room*.—A building, 30 feet by 20 feet.

11. *Canteen*.—A building, 50 feet by 30 feet.

12. *School House*.—A building, 20 feet by 15 feet.

13. *Armourers' and Tailors' Shop*.—A building, 30 feet by 15 feet.

CHAMBLY.

BARRACKS, FORT, ETC.

These properties were transferred by the Imperial Government to the Provincial Government of Canada, in 1856.

1. *Officers' Quarters*.—A wooden building resting on a stone foundation, 192 feet by 54 feet.

2. *Guard House*.—Stone, 48 feet by 51 feet.

3. *Infantry Barracks*.—Stone, 199 feet by 36 feet.

4. *Commissariat Storés*.—Two ranges of buildings, one of stone, 145 feet by 36 feet, the other of part wood and part stone, 224 feet by 32 feet.

5. *Commissary's Quarters*.—A stone building, 44 feet by 33 feet, with a wing 26 feet by 15 feet.

6. *Bakery*.—A stone building 39 feet by 24 feet, with a wing 13 feet by 25 feet.

All the above Nos., 1 to 6 were sold on the 14th of June, 1876.

7. *Fort Chambly or Portchartrain*.—This is a quadrilateral fortress of rubble masonry, with dressed quoins to angles and openings.

The works were commenced in 1709 and completed two years later, in accordance with the plans of Chief Engineer Chaussegros de Lery.

Originally it had four bastions, measuring from salient point of one to another 78 feet, the bastions being 35 feet in height, and the curtain 30 feet in height by 106 feet in length. The walls are about four feet in thickness, loop-holed for musketry.

At present there are only three of the outer walls standing, that next the river having been undermined and demolished by the action of the ice; slight repairs are being made to the remaining walls, and the debris of the fallen wall piled against the river bank to prevent further encroachment of the river during the spring freshets.

ST. JOHN'S.

POST OFFICE AND CUSTOM HOUSE.

This building has been erected on a lot having fifty-two feet six inches frontage on Richelieu street, and which extend back to Chambly Canal grounds; construction was commenced in 1877-78, and completed 1879-80.

The walls are brick, on stone foundations; the roof is of wood covered with shingles and deck covering of galvanized iron.

The basement is used for storage of fuel, heating apparatus, water closets, &c.

On the ground floor is the Post Office, and on the first floor the Custom House.

The building is warmed by hot water.

Water is supplied from the city service.

Plans, &c., prepared by this Department. Superintending Architects—Messrs. Hutchison and Steele.

BARRACKS.

This group of buildings, which is situated between the Montreal and Champlain Railway, and the Richelieu River, was handed over to the Provincial Government of Canada by the Imperial authorities 1856.

1. *Officers' Quarters*.—A two storey brick building 180 feet by 50 feet, and on a stone foundation.

2. *Barrack Buildings*.—Three, each 150 feet by 40 feet, two storeys built of brick, with stone basement. One of these has been since burned.

3. *Magazine*.—A stone building 70 feet by 40 feet.

4. *Hospital*.—A brick two storey building on a cut stone basement, 60 feet by 40 feet with a detached dead-house.

5. *Commissariat Store*.—A brick two storey building, with a stone basement 50 feet by 30 feet.

6. *Guard-house*.—A stone building 60 feet by 40 feet, since burned.
7. *Cook-house*.—An octangular building 50 in diameter having brick walls and stone basement.
8. *Stables*.—A brick structure 40 feet by 20 feet.
9. *Pontoon Shed*.—Of wood 90 feet by 40 feet, and now in an utterly dilapidated condition.

ISLE AUX NOIX.

FORT LENNOX.

This property was transferred in charge to the Provincial Government of Canada in 1856. The fortress is a quadrilateral earthwork, having bastions at angles and a ravelin on south-west side, and having earthworks, revetments, entrance gateways and bridges much out of repair.

The following are the buildings enclosed in the Fort, viz:

1. *Barrack Building*.—A two storey, bomb-proof stone structure, 240 feet by 40 feet, having on the ground floor a reading room, a recreation room, eleven rooms for married quarters, an infants' school and an adults' school, while on the first floor are quarters for five sergeants and 156 men.
 2. *Officers' Quarters*.—Of stone, 80 feet by 35 feet, two stories in height.
 3. *Orderly Room and Barrack Sergeants' Quarters*.—Similar to officers' quarters.
 4. *Magazine*.—Built of stone, 100 feet by 40 feet, situated in the north bastion now in a fair state of repair; adjacent are a cooperage and a sifting room, of stone each 25 feet by 20 feet.
 5. *Commissariat Stores and Artillery Stores*.—Two stone buildings, each 60 feet by 40 feet and two storeys in height.
- The above buildings, Nos. 1 to 6, inclusive, have roofs covered with tin.
6. *Cook-house and Cellars*.—Casemates 170 feet by 30 feet, situated at the north east entrance, and now much out of repair.

ROBINSON, COMPTON COUNTY.

DRILL SHED.

A wooden building 132 feet by 60 feet, with stone foundations—the latter out of repair—situated on Lot 20, Victoria Road Range, which is one acre in extent.

SHERBROOKE.

DRILL SHED.

A shed 130 feet by 60 feet, situated on Montreal street, somewhat out of repair.

IMMIGRATION SHED.

In a wooden one storey building 60 feet by 30 feet on a pile foundation, and situated in the immediate vicinity of the Grand Trunk Railway station. It was erected and occupied in 1871-72.

Heating is by stoves. Plans, etc., prepared by this Department.

ST. REGIS.

CUSTOM HOUSE.

This building was described in the report of the Commissioners of Public Works 1867.

Slight and essential repairs have been executed from time to time since the date.

DUNDEE.

CUSTOM HOUSE.

This has been fully described in the report of the Commissioners of Public Works, 1867.

Minor essential repairs have been executed since that date for the preservation of the buildings.

LAPRAIRIE.

BARRACKS.

This property, which was transferred from the Imperial to the Canadian Government on 5th November, 1856, consisted of 42 acres, 1 rood and 8 perches, and the following buildings, viz.,

1. *Officers' Quarters*.—A wooden building on stone foundation, two storeys, accommodation for three field and twenty-seven other officers.
2. *Barrack Building*.—Accommodation for 150 infantry, 50 cavalry and 64 horses.
3. *Barrack Building*.—Accommodation for 11 staff sergeants and 230 men.
4. *Hospital and Regimental Store Attached*.—Accommodation for fifty men.
5. *Barracks*.—Similar to No. 2.
6. *Guard Room*.—For 100 men and 6 horses.

Also a magazine, an engine house, a guard house, workshops, cook-house, farrier's shop, loose boxes, infirmary for horses, barrack store, forage barn, three cook-houses, privies, ashpits, wells, &c.

With the exception of officers' quarters, magazine, hospital, engine house, and guard house, the buildings were sold by the Dominion Government in 1859.

In 1867 the officers' quarters were burned.

ST. VINCENT DE PAUL.

PENITENTIARY.

The works in connection with this Institution executed previous to Confederation, were described at length in the Report of the Commissioner of Public Works for 1867, under the title of the Reformatory Prison of Lower Canada; all the works spoken of therein as in progress, were carried on to completion with the exception of the north pavilion and one of the dormitory wings.

The prison building completed as above, afforded the following accommodation.

The central block contained the Deputy Warden's residence, the offices of Warden, Deputy Warden, Secretary, Chief Keeper, the surgery, and on the fourth storey the three water tanks with a capacity of 2,000 gallons each.

In the south wing was the dining hall, school room, kitchen, pantry and drying room; in the north wing, the Protestant Chapel, wash-house, &c.

The south pavilion had a vegetable cellar in basement, fifteen punishment cells on ground floor, and the Catholic Chapel on the first floor. The south dormitory contained in the basement ten dungeons, and in the upper storey three tiers of forty cells each, making a total of 130 cells in the dormitory.

The brick building in yard, 39 feet by 25 feet, is used as a tailors' and shoemakers' shop.

The bakery is in a wooden building 30 feet by 20 feet.

The stone two storey building, 73 feet 6 inches by 29 feet 6 inches, is used as a workshop.

The Protestant Chaplain's dwelling is an old two storey stone building, 38 feet by 32 feet, outside the walls, to the southward.

The Warden's residence is an old stone building 45 feet by 37 feet 6 inches, situated between the Terrebonne Road and River des Prairies, one-quarter of a mile from the prison, on a lot of ground $2\frac{1}{2}$ acres in extent.

The pump house is a one storey stone building 37 feet by 25 feet, with roof covering of metal, and is located mid-way between the Warden's residence and the river. In it is a pump for the water service of the prison building, officers' quarters and other buildings connected with the Institution.

The Engineer's residence is a one and a half story brick building, 36 feet by 35 feet, formerly the pump house, which was converted first into a Chief Keeper's dwelling and subsequently into one for the Engineer.

All the above works were accomplished previous to the 19th May, 1873, on which date the institution was first opened as a penitentiary.

A range of guards' dwellings, 163 feet by 30 feet, two storeys in height, with four kitchen wings, 22 feet by 13 feet, was commenced in May, 1874, and carried on under the direction of the Board of Prison Inspection until the close of the same year; in June, 1875, this Department assumed control and the building was completed in the following November. It is a wooden structure, veneered with brick, resting on a stone foundation.

A general plan for the extension of the prison was approved of in 1877. This comprised a guards hall 67 feet square, at the further end of the cell wing, from which three new wings (each 126 feet by 47 feet) radiate, forming, with the original cell wing, a plan in the form of a Greek cross, of these the south wing was completed in 1879, and the north wing is now nearly finished. These, with the original cell wing give 444 cells.

The cells in the new wing are 8 feet by 4 feet, and 8 feet in height, and have external walls of cut stone and internal walls of brick, the floors of the cell corridors are of limestone flagging, those of south wing cells being of cement, and of the north wing oak. The roofs of the new wings are wood, covered with metal.

In 1876 the north pavilion was finished, and occupied as a Roman Catholic Chapel, and the south pavilion arranged as an extension of the south cell wing, giving an additional sixty cells.

In 1879 an addition of 83 feet by 40 feet was made to the Roman Catholic Chapel, new seating executed in ash, the ceiling elaborately ornamented in plaster and the chancel windows filled with stained glass. This building has accommodation for 500 convicts.

There is in course of erection a stone three storey dining hall 127 feet by 68 feet arranged to admit of future extension; the walls are to be lined with brick, the floors constructed with iron joists and brick arches covered with oak flooring.

The basement will contain a kitchen, scullery, stores, wash house, and baths, the dining hall is to occupy the principal floor, and a drying room the uppermost storey; in locating the dining hall it was found that the boundary wall required extension and an additional 100 feet on the north side was enclosed by a temporary wooden fence.

The barn and root cellar is a stone building 81 feet by 41 feet, about $\frac{1}{2}$ mile from the prison (erected in 1877), and has a root cellar in the basement, the walls of which are lined with brick and the floor of cement.

The farm buildings and stables were destroyed by fire in September 1877, and temporary wooden stables with brick lining 49 feet by 28 feet, to accommodate 14 horses; also a carriage house, 41 feet by 36 feet, were completed in November following, at the same time a wooden pigery with a capacity for 80 hogs, was constructed 50 yards outside the boundary wall.

The stone cutters' shed being too small and inconveniently located, a wooden building 125 feet by 40 feet, with a capacity for 80 workmen, was erected in 1878.

The smithy being too small and unsuitable, a wooden building, with inside lining of brick, and with a capacity for four fires, was erected in 1877.

An oven being required, an addition of 30 feet by 12 feet was made to the bake-house during 1881-82.

A building for the storage of powder, etc., has been recently erected at the quarry, and is of stone, lined with brick.

During the past year a wooden building, one and a half storeys in height, thirty feet square, has been erected within the boundary wall for Storekeeper's and Clerk of Works' offices, and for storage of hardware.

A wooden stable and carriage house, 30 feet by 18 feet, has been built at a distance of fifty yards outside the boundary for the Deputy Warden, and at the same distance is an implement-shed of wood, 76 feet by 31 feet.

The brick yard is one quarter of a mile northward of the prison, and the bricks used in construction of the prison works are made by the convicts. An addition to the brick shed, 60 feet by 40 feet, was erected in 1878.

The main drain, which is in progress, is to run northward a distance of 750 yards into a creek which empties into the Ottawa River. Commencing at the prison, for 140 yards lineal, the excavation is in solid rock and the remainder through clay.

Water is supplied to the prison buildings, guards' dwellings, stables, etc., from the tanks in main building. Hydrants are placed in front of prison for fire protection; wood sheds and outbuildings in the rear.

As no building stone was to be had on the penitentiary property, a farm of 65 acres, with a good quarry thereon, was purchased, and all the stone used for building purposes at the prison has been obtained thereat.

The lime kiln is situated fifty yards northward of the prison, and has a capacity of 1,000 bushels.

A tramway with a 3 feet 6 inch gauge, $1\frac{3}{4}$ miles long, to connect quarry with prison yard, was built in 1878.

MONTREAL.

POST OFFICE.

The building is situated on the corner of St. James and St. François Xavier streets, extending back to Fortification lane and adjoining the Bank of Montreal. It covers the entire lot, occupying an area of 11,804 square feet.

The contract for construction was entered into in 1872-3, and the works completed in 1876-7.

The building has a basement, a first, a second and an attic story. The basement contains heating furnaces and fuel rooms, rooms for receiving and despatching mails, water-closets, etc. The ground floor is the Post Office, on the second floor are offices for Post Office Inspector and district offices of the Militia Department.

The walls are built of local limestone with brick backing. The ground and first floors are constructed of iron joists and brick arches.

The roof is of wood, covered with slates on slopes and galvanized iron on flats.

The style of architecture is Italian Renaissance. The front on St. James street consists of a main or central feature with two slightly recessed wings; above St. James street level it is divided horizontally by moulded cornices into two heights, the lower being a continuous facade formed of piers and columns with entrance doors and windows between; the upper portion is divided into similar bays by Corinthian columns and pilasters; the bays are divided horizontally by a string course between first and second floors. The main cornice is highly enriched, and above is an attic with mansard roof, having on St. James street a central dome in two stages, the upper arranged as a clock tower and the whole surmounted by ornamental cresting.

The two remaining street elevations are similarly treated, but much plainer than St. James street front.

Heating is by hot water; gas and water supply connected to city services.

Architect, Mr. H. M. Perrault.

CUSTOM HOUSE.

The former Custom House (described at length in Report of the Commissioner of Public Works, 1867,) having been found inadequate to the rapid increase of business, a more commodious building became necessary.

The building known as the Royal Insurance block, fronting on corner of Common and Commissioner streets, was offered to the Dominion Government in 1868-69, and in consequence of its being centrally situated and otherwise suitable and also of the delay which would arise from the erection of a new building it was purchased in 1869-70.

Extensive alterations were made to the interior during 1870-71, to render it suitable for a Custom House.

The building is of local limestone, with floors and roof of wood, the latter covered with zinc; and it consists of three floors, with basement and attics.

The basement contains boilers, fuel, etc. On the ground floor are surveyor landing waiters, gaugers, tide waiters, etc. On the first floor is the long room, the collector's office, shipping office, clerks, etc. On the second keepers' rooms, water closets, &c., &c.

There are brick vaults provided for the various branches.

The building is warmed by steam, and supplied with water and gas from the city services.

EXAMINING WAREHOUSE.

Is situated on the corner of Common and McGill streets. Works were commenced during 1874-75 and completed in 1877-78, at which latter date the building was occupied.

It is irregular in outline, and covers an area of 23,800 square feet. It is four storeys in height, covered by a flat roof.

The ground plan is divided into four by three parallel tramways reaching from street to street, and from street to lane. The interior of the three lower storeys is divided into sections of 18 feet in width by brick walls parallel to the tramways, with arched openings at regular intervals for communication and easy arrangement of goods. The attic floor is open, and the roof is supported on posts resting on the division walls of lower storeys. The outer walls are local limestone, the roof is of wood covered with galvanized iron, and the joists and flooring are wood with space between joists filled with concrete, which is supported on corrugated galvanized iron.

Steam hoists are in use for elevating and lowering goods.

Warming by steam. Gas and water from the city services.

Architects, Messrs. Bourbeau and Leprohon.

INLAND REVENUE BUILDING.

This was formerly known as the Custom House, and as such was described in the Report of the Commissioner of Public Works, for 1867.

It was altered to suit the requirements of the Inland Revenue on its being vacated by the Customs, in 1871-72.

During 1881-82, the building was extended 26 feet towards the St. Lawrence, the extension being the width of the existing building. The original front was taken down and rebuilt; the remaining outside walls are in harmony with the original work.

Roof of wood, covered with tin.

Gas and water from the city services.

It is intended to erect a hot water apparatus for warming.

GEOLOGICAL MUSEUM BUILDING.

This building was described in the Report of the Commissioner of Public Works 1867.

During 1871-72, the caretaker's rooms being required for museum purposes, a two storey dwelling for the caretaker was erected in the rear.

Museum building warmed by steam.

Gas and water from the city services.

This building has been recently sold to the Provincial Government of Quebec.

MILL STREET IMMIGRATION STATION.

This building is situated on the line of Mill street and fronting on the St. Lawrence River. It is built with stone foundation, brick walls and gravelled roof. The central portion, which is used for immigrant offices, has two storeys, the upper being dormitories; and two one-storey wings, which are used as kitchen and baggage rooms.

Constructed during 1871-72. Heating is by stoves. Gas and water from the city services.

IMMIGRANT BUILDING.

This depot is at the Tanneries, or a siding of the main line of the Grand Trunk Railway and consists of a dining hall, fifty feet by twenty-five feet; a baggage room, sixty feet by thirty feet; a wash-house, twenty-four feet by sixteen feet; an office, a cook house and a water closet, all separate wooden one storey buildings.

Buildings warmed by stoves.

QUEBEC GATE BARRACKS.

The group of buildings known as the Quebec Gate Barracks, or Water Street Barracks, was handed over to the Dominion Government on the 28th November, 1870, with the exception of the hospital and commissariat store, which were handed over 1st February, 1871; shortly afterward they were all disposed of to the City Corporation of Montreal, and have since been demolished. A description is included in the Report of the Commissioner of Public Works, 1867. The buildings transferred were principally of stone, and comprise the following, viz. :—

1. *Soldiers' Barracks.*
1. *Married Quarters.*
3. *Garrison Hospital.*
4. *Commissariat Stores.*
5. *Provost Sergeant's Quarters and Garrison Library.*
6. *Barrack Offices.*
7. *Barrack Stores.*
8. *Ordnance Store and Cavalry Stables.*
9. *Garrison Workshops.*
10. *Guard House.*
11. *Recreation Rooms.*
12. *Officers Guard Room.*
13. *Prisoners Rooms.*
14. *Magazine.*
15. *Cook House.*
16. *Cavalry Stables.*
17. *Infirmery Stables.*
18. *Stables.*
19. *Officers Stables.*
20. *Wheeler's Shop.*
21. *Farrier's Shop.*
22. *Smithy.*
23. *Gun Sheds.*
24. *Wash House.*
25. *Bakery.*
26. *Brew House.*
27. *Boat and Fuel Sheds.*
28. *Oil Store, etc.*

Also latrines, fuel sheds, etc.

HOCHELAGA BARRACKS.

These are a portion of the War Department Buildings in Canada surrendered to the Dominion Government in 1870-71, and comprise the following, viz :

1. *Old Cavalry Barracks*.—A brick building, two storeys in height, with accommodation for 104 men, and the canteen in part of the lower flat of the building.

2. *Brick Cook House*.

No. 3 to 12, following, are of wood.

3. *Lock-up*.

4. *Guard House*.

5. *Smithy*.

6. *Ablution Room*.

7. *Stables for Ninety-Seven Horses*.

8. *Wheeler's Shop*.

9. *Saddlerly*.

10. *Gun Stores*.

11. *Gun Sheds*.

12. *Harness Room, etc*.

The prison establishment comprises Nos. 13 to 18 inclusive, attached to which are latrines, privies, etc.

13. *Chief Warder's Quarters*.—A two storey stone building.

14. *Warder's Quarters*.—A one storey stone building.

15. *Lockups*.—One, a one storey brick building, contains ten cells, and the other with two stories and forty cells.

16. *Prison Offices and Stores*.—A three storey brick building, with cells for seventy prisoners.

17. *Engine House*.—A 1 storey wooden building.

18. *Store House*.—One storey, built of wood.

Nos. 19 to 24 inclusive are known as the Hut Barracks, all of which are one storey buildings, and of wood with the exception of Nos. 23 and 24.

19. *Soldiers' Barracks*.—A capacity for forty men.

20. *Clothing Store*.

21. *Office and Orderly Room*.

22. *School Room, Library and Reading Room*.

23. *Tailors' Shop*.

24. *Cook House*.

On the 17th December, 1875, Nos. 4, 5, 7 and western half of No. 1 were burned.

MILITARY BUILDINGS, ST. HELEN'S ISLAND.

These properties were handed over to the Dominion Government by the War Department, on the 28th November, 1870.

The island contains 123 acres, 3 roods, and 20 perches.

1. *Barracks*.—A stone building 150 feet by 30 feet, two storeys, attic and basement, the latter bomb proof, having the roof covered with tin, and providing accommodation for eight officers, eight non-commissioned officers, and seventy-two rank and file.

Note.—This building was destroyed by fire in 1875.

2. *Barrack, Canteen and Meat Stores*.—Of the same construction, materials and number of storeys as the last mentioned, 140 feet by 30 feet.

3. *Well House*.—A one storey stone building, 12 feet square, with tin covered roof.

4. *Ablution Room*.—A brick one storey building with sheet iron roof covering 20 feet by 10 feet.

5. *Expense Magazine*.—A bomb proof one storey building 70 feet by 30 feet, with a capacity for 1,200 barrels, roof covering of tin; adjoining this is a cooperage and sifting room.

6. *Ordnance Stores*.—Two wooden buildings, one 430 feet by 36 feet, two storeys, basement and attic, the roof covered with iron; the other 410 feet by 20 feet, one storey, and with roof covering of felt.

7. *Armouries*.—Two in number, built of stone, measuring together 450 feet by 25 feet, two storeys in height, and with roof covering of tin. It has a capacity on ground floor for 40,000 stand of arms, and provision for general stores above.

8. *Combustible Stores*.—A stone two storey building, with a tin covered roof, 90 feet by 25 feet.

9. *Combustible Store*.—A stone one storey building, with roof covering of asphaltum, 25 feet by 30 feet.

10. *Grand Magazine*.—One storey of stone 100 feet by 60 feet, with roof covering of tin, capacity 4,704 barrels.

11. *Old Guard Room*.—A one storey wooden building, 25 feet square.

12. *Block Houses*.—Two in number, each 20 feet square, built of wood.

13. *Straw House*.—A stone one storey building covered with iron, 40 feet by 20 feet.

14. *Cottages*.—Two storey stone buildings, 90 feet by 30 feet with wooden roofs.

15. *Cottages and Workshops*.—Of wood, two storeys, 140 feet by 25 feet.

16. *Root-house*.—A stone building 25 feet by 20 feet, with a wooden roof.

In addition to those enumerated are latrines, fuel sheds, stables, wash-house, etc., principally of wood and dilapidated.

COUNTY OF ARGENTEUIL

DRILL SHEDS.

1. *St. Andrews*.—A building 120 feet by 40 feet, with armoury attached, both dilapidated, erected on lot 60, concession 4, Township of Argenteuil.

2. *Carillon*.—A building 60 feet by 30 feet, with a small armoury in very poor state of repair, situated on Centre street.

3. *Cushing*.—Shed of wood, 100 feet by 40 feet, with a small armoury adjacent, both in good condition, located on the Carillon Road.

PROVINCE OF ONTARIO,

OTTAWA.

HOUSES OF PARLIAMENT.

Works executed previous to Confederation were fully reported upon in the Report of the Commissioner of Public Works, 1867.

It was directed by an Order in Council, dated 29th February, 1868, that the construction of the Parliament Library should not be proceeded with. During the same year the furniture of Houses of Parliament and Government Departments generally was renewed.

Gas supply of House of Parliament and Departmental Buildings furnished by the Ottawa Gas Company.

In November, 1870, a contract was signed for the completion of the walls of Library building, and the materials for roof arrived from England.

In the following year a new Speaker's throne and reporters' gallery were erected, and the contract for completing central tower was entered into.

During 1873 the timber framing, etc., for Library roof was commenced by days' work, considering that it could thus be more expeditiously performed. Tenders were invited for slating, glazing, etc., for Library roof and for covering main tower.

The system of ventilation was re-arranged in 1874.

The condition of steam heating boilers was such as to necessitate their removal and replacement by four new tubular boilers one of which was intended for the new Library building. Alterations of the Speaker's rooms and reporters gallery were made and the masonry of Library building completed during the same year.

In the following year (1875) divisional walls in attic were built, and iron doors placed therein for protection against fire. Mains for fire service were laid in the basements, connected with hydrants placed at various points around the building, externally, for attachment of hose.

In 1877 the new Library building was completed and occupied.

It is floored with Canadian woods viz; oak, ash, cherry and walnut. Book-cases and fittings of pine, bookcases in three stories with eight divisions, the spaces between forming small alcoves enclosed with iron railing.

The upper stories of bookcases have projecting galleries floored with glass, and iron railing.

These galleries are reached by stone staircases. The offices of the Librarian, Secretary, etc., adjoin the Library proper.

The rooms immediately south of main library, first occupied for offices connected therewith, in 1877 were arranged for the accommodation of the Supreme Court, but on the conversion of the workshops into a Supreme Court building their temporary quarters were converted into a Commons reading room and retiring room for the members of the Cabinet and House of Commons.

Upper stages of main Tower have been arranged to receive new clock which was put in place and in running order in 1879.

During 1879-80 accommodation being inadequate, the reporters gallery was altered and extended.

An accidental fire took place in October, at the House of Commons, causing damage to ceiling, roof, furniture and walls of chamber. These damages were repaired and the chamber cleaned and decorated.

EASTERN AND WESTERN BLOCK DEPARTMENTAL BUILDINGS.

Works executed previous to Confederation are treated of in the report of the Commissioner of Public Works, 1867.

During the fiscal year 1870-71 the attics over the Department of Agriculture were divided and finished as offices for the Census staff.

In the two years following the remaining portions of the Western Block attic were converted into rooms for the patent models and for additional office room for Department of Public Works, and a portion of the Eastern Block attic was converted into offices for Department of the Interior.

In 1873-74 two new tubular boilers were placed in boiler house of Eastern Block also two in the Western Block, as those previously in use were considered inadequate and their removal advisable owing to their condition. An iron staircase from first floor to attic was erected adjoining the Council Chamber.

During the same year the attics of Eastern and Western Blocks were divided into sections, by walls of brick, with iron doors to lessen risks in case of fire.

Further accommodation being required, plans and specifications were prepared tenders were invited and a contract entered into during 1874-75 for the basement of an extension of the Western Block, which was completed in 1875-76 and contract entered into for the superstructure. This building was carried on continuously until completion in January, 1877, when it was partially occupied as offices. It covers an area of 17,900 square feet, furnishing fifty-eight additional offices on the three upper floors, besides ten rooms in the basement. Central corridors on each floor, ten feet wide, running the entire length of the building. Entrances are provided on ground and basement floors. The main staircase is in rear of the principal tower. External walls are of stone, similar to original building, lined with brick, and with a cavity between outer and inner wall; internal or division walls of brick. Floors are of

structed with iron joists and brick arches levelled up with cement and covered with wood. The floor levels of original building are maintained in the extension.

The principal tower, which is 274 feet in height from ground to top of final, is situated about the centre of the western front and contains the principal entrance and vestibule.

The main roof framing is of iron, excepting necessary woodwork for securing roof boards; the decks are covered with galvanized iron and the sloping portions with slate. Heating is by steam (direct radiation). The gas and water supply are an extension of the original service.

During the completion of the extension, alterations were made in certain rooms of the original building which adjoined, and preparations were made to accommodate an hydraulic elevator which was fitted up in 1880.

The vault accommodation of the Finance Department being found inadequate, a fire and burglar proof vault was constructed within the Eastern Block during 1880-81. Architect for the extension, T. S. Scott.

GROUND, PUBLIC BUILDINGS.

During 1867-68 and 1869-70 the stone and the refuse building material arising from the construction of the Public Buildings were removed; a walk was formed around Barrack Hill, about 40 feet from summit, through the natural brushwood.

In 1868-69 the Major's Hill and the Nepean Point properties were transferred to this Department by Order in Council, and were fenced and otherwise improved.

A fence wall has been constructed on lines of Wellington and Bank streets. This fence or boundary wall is of stone, surmounted by cast iron railing and with wrought iron gates.

A plan of laying out the grounds was adopted, and work connected with the carrying out of the design (viz., grading terrace-wall steps, gas standards, summer house, roads, sodding, drains and footpaths) were executed.

In 1878-79 a propagating house for bedding plants required in decorating the grounds, was constructed on the north-western corner of the grounds, to which addition has since been made.

GOVERNMENT WORKSHOPS.

The workshop for the Departmental staff of workmen being of a temporary character, in 1873-74 a permanent building was commenced and was carried on to completion and occupation in the autumn of 1875. It was of two storeys, of stone, with wooden roof covered with slates and galvanized iron.

Coal sheds, lumber sheds, and drying house were erected adjoining, and a wall, with gates enclosed the workshop yard from the Public Grounds. The building was fitted up with wood working machinery, and was used for its original purpose until June, 1880, when it was decided to close the building as a workshop. The machinery was disposed of by auction, and in 1880-81 a contract was entered into to convert this building into a Supreme Court, and a portion of the drying house in yard into a laboratory and photometric gallery for Department of Marine and Fisheries.

Plans, etc., prepared by this Department.

NEW SUPREME COURT AND ART GALLERY.

The building was originally constructed for Government Workshops and was converted to its present uses and occupied during the year 1881-82.

The external appearance was rendered more ornate by the addition of gabled windows required for lighting the Court room.

The ground floor contains Picture Gallery, public entrance, Barristers' rooms, offices, vault, water closets, etc.

The first floor contains Court room, Judges' Library, consulting and waiting rooms, and Picture Gallery.

Heating is by steam. Gas and water supplied from the city services. Plans, etc., prepared by this Department.

GOVERNMENT HOUSE.

On the 7th of August, 1865, the land forming the estate attached to this residence was leased by the Government from Thomas and Ann McKay, at an annual rent of \$4,000, for a period of twelve years, with power to purchase said lot at any time within three years from the date of the lease, at the price of \$70,000, or at any time during the remaining nine years, to be determined by arbitration.

An additional lot on the river front, and known in the locality as "the Bay," was leased on the 1st September, 1867, from the same parties, at an annual rent of \$720, with the right to the Government to purchase at a price to be ascertained, in case of dispute, by arbitration.

In the spring of 1868 the Government decided on purchasing the whole property, comprising the following lots, viz.:

	Acres.	Roods.	Perches.
The "Rideau Hall Domaine"	77	1	0
"The Bay"	9	1	25
"The Triangle"	1	0	19 ²⁰ / ₁₀₀
Making in all	87	3	44 ⁹⁰ / ₁₀₀

at the total price of \$82,000, and on the 28th of July, 1868, the deed of sale was executed.

There was on the estate a stone dwelling, which was enlarged and converted into a commodious mansion. The grounds were fenced and laid out with ornamental walks and gravelled roads, and planted with young trees and shrubs. A conservatory, viney, flower garden, kitchen garden, cottage residence, stabling, coach house, guard house, lodge, and iron gates were also added, the greater portion of which were completed and the mansion furnished during the fiscal year, ended June, 1866.

During the same year a cottage for the secretary, a new gate house, porters' lodge, and a gateway with stone pillars and iron gates at the principal entrance to the grounds were erected; also, a cottage for the gardener, fencing of river front and kitchen garden, sinking wells for garden, and stable water supply, erecting outbuildings, &c. The secretary's cottage and the gate house are of brick, the latter with stone dressings, while the gardener's cottage is of wood, rough cast, all roofed in wood and on stone foundations.

In the following year an addition was made to end of main corridor for a conservatory and a portion of the original conservatory converted into a forcing house. The back road to Governor's stables was changed in direction, elevated, levelled, macadamized and fenced. The water supply at this time was from wells for hard water, which for laundry purposes river water had to be procured.

The Military secretary's house, one storey brick house, had an additional storey added during 1872-73, and in this and the following year a reception room and greenhouse were added to the main building, and the entire roof of the house re-roofed. In the latter year the City of Ottawa water main was extended to Government House, and has supplied water for all purposes continually since then.

In 1876-77 additional rooms were added to kitchen wing and Private Secretaries' apartments.

During 1877-78 a gasometer house, containing a gasometer with a capacity of 25,000 cubic feet was erected. Excavation had to be made in rock for tank which was lined with brick in cement; foundations of gasometer house are of stone, with brick superstructure and roof of wood; adjoining it is an engine and boiler house with exhausting apparatus to fill gasometer when city pressure is insufficient.

In 1878-79 a new laundry was erected, 26 feet by 44 feet, of brick on a stone foundation, with wooden roof, and containing on ground floor a wash-house, a y

closet, and a laundry; on first floor a kitchen, a living room, and three other rooms. It is supplied with water and gas.

In 1879-80 the system of drainage was completely re-arranged; a temporary cloak room was built, and additions made to skating rink, including a log cabin.

Heating of Government House is by hot air furnaces. All works carried out under the immediate superintendence of this Department.

POST OFFICE AND CUSTOM HOUSE.

The site was selected during the fiscal year 1871-72, being a portion of the Ordnance property situated between the west ends of Sappers' and Dufferin Bridges; it is central and in close contiguity to the Public Buildings.

In order to obtain a lane in rear, a strip of land was purchased from the Egan estate adjoining, containing 4,656 superficial feet.

The work of construction were commenced in 1872-73 and the building completed and occupied in 1875-76.

It covers an area of 10,440 square feet. The style of architecture is Italian in character. The external walls are of Berea sandstone and are lined with brick.

Floors, partitions and roof of wood; roof covered with slates and galvanized iron.

The basement and sub-basement are occupied as store-rooms, examining warehouse and boiler and fuel rooms.

The ground floor contains the Post Office only; the Custom House and Inland Revenue and the District Post Office Inspection occupying the first floor.

The second floor accommodates the Ottawa River Works office, Accountant of Penitentiaries and laboratory for the local Collector of Inland Revenue.

Brick safes are provided for the various departments on the several floors.

The building has a steam heating apparatus.

Gas and water are supplied from the city services.

Superintending Architect, Mr. Walter Chesterton.

GEOLOGICAL MUSEUM.

The building, formerly known as the Clarendon Hotel, on the north east corner of Sussex and George street, was acquired for the purpose of a Geological Museum, and was altered, and occupied as such during the fiscal year 1880-81.

The museum has a frontage on Sussex Street of 63 feet, and on George Street of 156 feet.

The basement is divided into rooms for storing and unpacking specimens, as also rooms for lavatories and heating apparatus.

The public entrance to the ground floor is in Sussex Street.

The ground floor contains drawing office, chemist's laboratory and office, safe, reception room and offices of Director and Accountant.

The first and second floors are occupied by museum rooms and offices.

A large part of the fittings of the former museum (Montreal) were re-used here. Building warmed by a hot water apparatus. Gas and water from city services.

Plans, etc., prepared by this Department and work carried out under its immediate supervision.

GUN SHED.

This building which was described in the Report of the Commissioner of Public Works, 1867, is now used as a store house by the Department of Marine and Defence.

COUNTY OF CARLETON.

DRILL SHEDS.

Ottawa.—In 1878-79 a site was chosen for this building on the eastern side of Cartier Square, and the building was contracted for in the same year and completed in the year following.

The building is of brick, on a stone foundation, and roofed with wood.

It consists of a large, central hall, 75 feet wide by 178 feet long, fifty feet from floor to apex of roof. Surrounding the hall on three sides, and communicating with same, are rooms for Field Battery, Cavalry, Garrison Artillery and Foot Guards, orderly rooms, quarter-masters' rooms, stores and museum; over a portion of these are band rooms, reception rooms and stores.

Heating is by stoves; gas and water from the city services.

Plans, &c. prepared by this Department, and works carried out under its supervision.

2. *Kinburn*.—A wooden shed, 80 feet by 40 feet, two storeys in height, with the upper storey for armoury, etc., 80 feet by 24 feet, the armoury being 78 feet by 12 feet. It is situated on a part of Lot 12, Concession 6, in Township of Fitzroy, and is in good condition.

COUNTY OF LANARK, ONT.

DRILL SHEDS.

1. *Carleton Place*.—A wooden shed, 80 feet by 48 feet, with armoury in roof, 20 feet by 12 feet. Erected in 1867.

2. *Perth*.—A wooden building, 150 feet by 80 feet, with armories and caretaker's quarters attached, situated on lot 8, south side of Heriot street, and in need of repairs built in 1868.

COUNTY OF RUSSELL, ONT.

DRILL SHEDS.

1. *Vernon*.—A wooden building, 80 feet by 48 feet, with a lean-to armoury 12 feet by 12 feet, situated on 6th con. road, Township of Osgoode. It was built in 1869, and requires repairs.

2. *Metcalfe*.—The same size shed as Vernon, but armoury 18 feet by 13 feet, situated on Byron street, and in excellent condition; built in 1871.

CORNWALL DRILL SHED.

DRILL SHED.

Shed 80 feet by 54 feet, of wood, with a lean-to armoury and band room (the latter dilapidated), situated on south-west corner of lot 16, south side of Fourth street; erected in 1868.

PRESCOTT.

PORT WELLINGTON.

This is a quadrilateral earth work 250 feet by 300 feet (with a salient angle in the centre of the north face) enclosing a court yard containing a block house, etc., and surrounded by a cedar paliade protected by a ditch on the eastern, western and southern faces.

There is a stone caponier in the centre of the southern ditch and two open traverses at the northern ends of the eastern and western ditches. The gateway is on the northern face eastward of the salient.

The court yard contains a two storey stone block house 50 feet square, and the following wooden buildings, viz.: A guard house, a cook house, an armoury and latrines. All the buildings are in a fair state of repair.

COUNTY OF GRENVILLE, ONT.

DRILL SHEDS.

1. *Burritt's Rapids*.—A wooden building 84 feet by 48 feet, with an armoury 24 feet by 15 feet attached, situated on the Bank of the Rideau Canal and was erected in 1869.

2. *Merrickville*.—Same size as that at Burritt's Rapids, and situated near the Rideau Canal. It was erected in 1868.

• BROCKVILLE.

GRANT'S ISLAND BLOCK-HOUSE.

This was transferred to the Provincial Government of Canada by the Imperial authorities in 1856.

COUNTY OF LEEDS, ONT.

DRILL SHEDS.

1. *Gananogue*.—A wooden shed 120 feet by 60 feet, with a lean to armoury 24 feet by 16 feet, harness rooms, etc., 50 feet by 24 feet, constructed between the trusses of the roof.

Erected on lots Nos. 3 and 4, sub-division of block O, in 1868, and now in good condition.

2. *Lansdowne*.—An 80 feet by 48 feet shed with a lean-to armoury 24 feet by 16 feet, situated near the corner of Centre street and concession road, and is in a poor state of repair. Built, 1868.

KINGSTON.

NAVAL RESERVE, AND ROYAL MILITARY COLLEGE.

The naval reserve, Kingston, with the buildings thereon, were delivered over to the Dominion Government by the officer commanding R. E. in Canada, on the 24th January, 1871.

At that date the following buildings, Nos. 1 to 31 inclusive, were in existence:

1. *Cottage*.—One storey, of wood, (since demolished).
2. *Old Stable*.—A one storey log building (since demolished).
3. *Carpenter's Shop*.—One storey, wood (since demolished).
4. *Cottage and Shed*.—Similar to No. 3 (since demolished).
5. *School*.—Similar to No. 3. (since demolished).
6. *Commodore's House*.—A two storey wooden building (since demolished).
7. *Ice House*.—Stone basement only; now in a bad state of repair.
8. *Cottage*.—Wood, one storey (since demolished).
9. *Steam Furnace*.—Stone, one storey (since demolished).
10. *Old Cottage*.—Wood, one storey (since demolished).
11. *Military Store Master's Quarters*.—Two storeys and basement with wooden roof, converted into officers' quarters by the Dominion Government.
12. *Well House*.—One storey, stone, and in good repair.
13. *Log Stable*.—One storey (since demolished).
14. *Old Cottage, etc.*—One storey, stone, now a wood shed and closets.
15. *Naval Cottages*.—Numbered 1 to 9, of stone, with wooden roofs, and are now used as servants' quarters; adjoining there are two wooden buildings, a fuel shed and carpenter's shop.

The following (Nos. 16 and 31 inclusive) were situated in the dock yard.

16. *Guard House*.—Stone, one storey, with wooden roof, now in good state of repair; attached to which is a one and a half storey stable, erected by the Dominion Government.

17. *Porter's Lodge*.—Similar to No. 16 in all respects.
18. *Kitchen*.—One storey, of wood, with roof covering of tin (since demolished).
19. *Store House, etc.*—Wood, one storey and loft (since demolished).
20. *Bouching Sheds*.—Similar to No. 18 (since demolished).
21. *Foreman's Quarters*.—Wood, one storey and attic (since demolished).
22. *Carpenter's Shop and Engine House*.—Wood, one storey and loft (since demolished).
23. *Coal Store*.—Stone, one storey and loft (since demolished).
24. *Smithy*.—Stone, one storey, with tin covered roof, and has been converted into a gymnasium by the Dominion Government.
25. *Boat-house and Store*.—Wood, two storeys (since demolished).
26. *Coal-house and Guard-house*.—Wood, one storey (since demolished).
27. *Main Store-house or Frigate*.—Stone building, 3 storeys, with basement and tin covered roof. Altered in 1874-75 for the purposes of a military school, and occupied as such in 1876.
- Paint-house, Stores, etc.*—Wood, one storey (since demolished).
29. *Laboratory*.—A two story wooden building, now used as general store building.
30. *Tar-house*.—Wood, one storey (since demolished).
31. *Old Magazine*.—Stone, with wooden roof.

In the vicinity of No. 11 (ante) a brick one and a half story building with a wooden roof has been erected for officer's stables, and a similar building erected adjacent to the Commandant's quarters.

In 1876-77 a contract was entered into for a new College building, which was completed and occupied in 1875. It covers an area of 1,080 superficial yards, with a frontage of 185 feet, and a depth of sixty-four feet. The building is plain in design, the walls being of local stone, the cutting of which was executed by convict labor at Kingston Penitentiary. It is four storeys in height, with wooden floors and roofs, the basement devoted to boiler and fuel rooms, cellars, kitchen, scullery, store rooms etc.; the ground floor to dining hall, library, day room, visitors' rooms, officers' room etc., etc.; and the first floor to lecture, class and store rooms.

The building is warmed by steam.

Architect, Mr. R. Gage.

During the demolition of part of Market Battery two of the lodges and gate houses were removed to the Naval Reserve and re-erected, fronting on the highway.

A brick dwelling, 54 feet by 40 feet, for the Commandant, was erected during 1876-77 within the reserve.

A wooden one and a half storey stable and wood shed, and also the following one storey wooden buildings, have been erected adjacent to the College :—

1. *Gun Shed*.
2. *Boat House*.
3. *Boat House*.
4. *Engineers' and Coal Shed*.
5. *Latrines*.
6. *Ice House and Meat Store*.
7. *Gate House*.

During this fiscal year a brick pump house, 30 feet by 26 feet, with engineer's residence over, was constructed.

Trees have been planted and roads made good throughout the grounds.

TETE DE PONT. BARRACKS.

Transferred to the Dominion Government by the Imperial Government on the 14th October, 1870.

1. *Soldiers' Barracks*.—A range of two-storey wooden buildings, 190 feet by 4 feet, is now used as a drill shed and officers' quarters, and is in need of repairs.

2. *Officers' Mess and Quarters*.—A two-storey stone building, 115 feet by 40 feet, with tin covering to roof.

3. *Soldiers' Barracks*.—A brick two-story building, with accommodation for two sergeants and forty-five rank and file, 50 feet by 40 feet, with wooden roof, now used as a canteen.

4. *Soldiers' Barracks*.—A wooden two-story and basement building with accommodation for two sergeants and twenty-two rank and file, size 40 feet by 35 feet.

5. *Soldiers' and Married Quarters, Guard Room, etc.*—A range of two-storey stone buildings, 200 feet by 40 feet, with tin covered roof, having accommodation for 9 sergeants and 210 rank and file

6. *Provosts' Cells and Soldiers' Quarters*.—A two-storey and basement stone building, 120 feet by 40 feet, with tin covering to roof, having accommodation for four sergeants and nineteen rank and file, now used as a storehouse.

7. *Cook-house*.—A one-storey stone building, with tin-covered roof, 15 feet square, now used as a coal oil store.

8. *Shot Shed*.—A wooden building, since removed.

9. *Cook-house*.—A one-storey stone building, with tin-covered roof, 50 feet by 20 feet, and now used as an engine house.

10. *Servants' Quarters*.—Two one storey stone buildings with wooden roofs, each 25 feet by 20 feet.

11. *Commissariat Store*.—A wooden building since removed and replaced by one of stone, which is used as quarter-master's store house.

12. *Ablution Room*.—A one storey stone building, 40 feet by 20 feet, with tin roof covering.

13. *Boat-house*.—A wooden building since removed, and replaced by one in stone inside Queen's Wharf.

14. *Wash-house*.—A stone one storey building, 20 feet by 15 feet, with a tin covered roof.

15. *Expense Magazine*.—A stone building, 18 feet by 12 feet, with tin roof covering, and having a capacity of 75 barrels.

16. *Old Stables*.—Of wood utterly dilapidated.

17. *Fire Engine House and Meat Store*.—A log building since removed.

18. *Barrack Offices*.—A stone two storey building, 30 feet by 20 feet, with roof of wood; now used by the Pembroke and Kingston Railway.

19. *Barrack, Commissioner's Store, Stables and Coach-house*.—A log building since removed.

20. *Barn and Forage Store*.—A one storey stone building, roof covered with tin. This with No. 21 are leased as a lumber yard.

21. *Granary*.—A wooden building.

In addition to the foregoing there are latrines, fuel shed, etc., attached to the various buildings.

22. *Gun Shed*.—A one storey wooden building erected by the Dominion Government.

FORT FREDERICK.

This property was transferred by the War Department to the Dominion Government on the 5th September, 1870. It consisted, in addition to the ramparts and walls, of the following, viz:

1. *Tower Fort and Magazine*.

2. *Stone Defensible Guard House*.

3. *Stores, Cook-house and Wash-house*.—Four wooden one storey buildings, one of which has since been removed.

4. *Latrines, etc.*

ARTILLERY PARK BARRACKS.

This property was transferred to the Dominion Government of Canada on the 9th of July, 1870.

1. *Soldiers' Barracks*.—A two storey stone building, 150 feet by 30 feet, with tin covering to roof, now in a fair state of repair; attached to these is a cook-house and ablation room 30 feet by 20 feet, built of same material as barracks.

2. *Officers' Quarters*.—A wooden one storey building, 50 feet by 25 feet, with a kitchen, servants' pantry and latrines attached.

2. *Stables, Fuel-shed and Cow-house*.—A dilapidated wooden structure.

3. *Engine house*.—A one storey stone building, 25 feet by 10 feet, with roof partially covered with tin and partially with shingles.

4. *Quarter-master's Store, Gun Shed and Battery Store*.—A wooden one storey building, 100 feet by 25 feet, in good repair.

5. *Wheelers' and Collar Makers' Shop*.—A brick one storey building, 50 feet by 20 feet, with wooden roof.

6. *Armourers' Shop*.—A brick one storey building, 25 feet by 18 feet, with wooden roof, having a wooden shoeing shop attached, both now in an utter state of dilapidation.

7. *Officers' Stables, Infirmary and Coach House*.—A wooden building, one storey and loft, 110 feet by 35 feet, in a fair state of repair.

8. *Guard House and Cells*.—A two storey building, part each of stone and brick, 40 feet by 20 feet, and with roof covering of tin.

9. *Commanding Officers' Stables*.—Same materials and dimensions as No. 7; now in an utterly ruined condition.

10. *Latrines*.—These are provided at various points.

FORT HENRY.

The buildings and fort were transferred to the charge of the Dominion Government on the 10th August, 1870, by the Royal Engineers Department.

All the works included in Nos. 1. to 19. are of stone.

Nos. 1. to 5. constitute the Advance Battery, each compartment of which is 30 feet by 19 feet internal dimensions.

1. *Fifteen Magazines*.

2. *Two Shell Rooms*.

3. *An Artillery Store*.

4. *A Commissariat Store*.

5. *A Guard Room*.

There is also in the Advance Battery a tank with a capacity of 13,332 gallons.

6. *Officers' Quarters*.—Ten rooms for quarters, an officers' mess, an ante-room and mess mate's room and a wine cellar, all excepting the last named being 27 feet by 18 feet each, internal dimensions.

7. *Two Officers' Kitchens*.—16 feet by 8 feet each.

8. *Two Guard Rooms*.—Each 20 feet by 15 feet inside.

9. *Garrison Cells*.—Two of which are 4 feet square, and two 12 feet by 9 feet.

10. *Engineers' Store, Orderly Room and a Commissariat Office and Store*.—Each 30 feet by 12 feet.

11. *Mess Kitchen, Commissariat Stores, a Bakery, a Barrack Store, an Ablution Room, Two Canteens, an Advance Store and an Engineers' Store*.—Each 18 feet by 4 feet internal dimensions.

12. *Vegetable Store and Regimental Store*.—Each 40 feet by 22 feet.

13. *Artillery Store*.—40 feet by 12 feet.

14. *Three Magazines*.—One of which is 32 feet by 19 feet, one 18 feet by 19 feet and the third 18 feet by 16 feet.

Over one side of the fort there are,

15. *Soldiers' Rooms*.—Numbered from 1. to 16., each being 37 feet by 18 feet internal dimensions.

16. *Staff Sergeants' Rooms*.—Two in number, 23 feet by 18 feet.

In connection with and adjoining part of the outermost wall are—

17. *East Branch Tower*.

18. *West Branch Tower.*

19. *Reverse Fire.*

20. *East Reverse Fire.*

During 1875-76 the walls and casements were roofed, with a wood block pavement, tarred and gravelled, to prevent damage by water, etc., and the walls pointed.

ORDNANCE YARD (FORT HENRY.)

This property was surrendered to the Dominion Government by the War Department in 1870-71.

1. *Foreman of Stores' Quarters.*—A two storey wooden building, with lean-tos on three sides.

2. *Gun Sheds.*—A wooden building on a stone foundation.

3. *Storehouses.*—Three in number, two of two and a-half stories and one of one and a half.

4. *Guard House (now a Storehouse).*—Wood, on a stone foundation.

5. *Officers' Stables.*—Wood, on a stone foundation.

Also various outbuildings, latrines, etc.

MILITARY HOSPITAL AND COTTAGES, FORT HENRY.

These were transferred to the charge of the Dominion Government in 1870-71, and consist of the hospital, a three-storey stone building, with tin-covered roof, and five wooden one-storey cottages.

CUSTOM HOUSE.

A full description of this building was given in the Report of the Commissioner of Public Works, 1867, since which date it has merely received essential repairs and renewals.

POST OFFICE.

This building was fully described in the Report of the Commissioner of Public Works, 1867, since which date essential repairs only have been executed in connection therewith.

IMMIGRATION STATION.

This depot is situated at the city end of the Grand Trunk Railway. The building is 60 feet by 37 feet, two storeys in height, built of wood, and resting on a stone foundation, the roof being covered with gravel.

The ground floor contains offices, dining room, kitchen, etc., and the upper floor devoted to dormitories.

Constructed during the fiscal year 1871-72.

Architect, Mr. John Power.

DRILL SHED.

A wooden building 200 feet by 80 feet, with a wing in rear 30 feet by 20 feet for staker's quarters, and lean-to armouries 15 feet by 7 feet, all in want of repair. It is situated on Union Street and was built in 1864.

PENITENTIARY.

This institution is situated on King Street, at a distance of about two miles from Kingston Market House, on the W. $\frac{1}{2}$ of Lot 21, Township of Kingston, which contains 117 acres and was purchased in 1833. It has a frontage on Lake Ontario, protected by a breakwater, and with a wharf for six large vessels, the minimum

depth of water being 16 feet. The area of yard is 10 acres, 3 roods, and 14 perches, surrounded by a boundary wall of cut stone, 26 feet in height, with guard towers at angles and at West Lodge, and having the main entrance to enclosure on King's Street.

The main building or penitentiary was commenced in 1833, and is a cut stone building, in the form of a cross, with a rotunda at the intersection, 56 feet in diameter, lighted from the roof; the northern wing is 140 feet by 64 feet 6 inches, three storeys in height, with a cellar vaulted in stone, and contains offices of Warden, Deputy Warden, Accountant and Chief Trade Instructor, Chief Keeper's hall, mess room, Deputy Warden's residence, Roman Catholic chapel, kitchen and female prison, the last named being on the ground floor, having 62 cells, each of which is 8 feet by 2 feet 6 inches, and 6 feet 4 inches in height; this wing is flanked on the east by a female prisoners' yard, enclosed by a stone wall, against which the wash-house is built, and on the west by a similar enclosure for the Deputy Warden; the eastern, western, and southern wings are each three storeys in height, the eastern and western measuring 95 feet by 64 feet 6 inches each, and the southern 85 feet by 64 feet 6 inches, each wing containing 5 tiers of cells (each 8 feet by 2 feet 5 inches by 6 feet 4 inches), with 54 cells in a tier, making a total of 810 cells in the three wings.

The south workshops are situated on the southern side of the yard, two storeys in height and in the form of a cross, with a square building at intersection 54 feet by 48 feet, having a cupola for ventilation, and two stone stairways leading from the centre upward to a stone gallery, which gives access to the workshops on the first floor. The west wing is 140 feet by 54 feet, having on ground floor the foundry, moulding shop, engine room, boiler room, drying kiln, etc., and on the first floor the foundry and finishing shops. The southern wing is 70 feet by 60 feet and contains on the ground floor a foundry, blacksmith shop, brass moulding shop, etc., and on the first floor a drying room. The eastern wing is 140 feet by 54 feet with the stone cutters' shop on the ground floor, and on the first floor offices and japanning and packing room. The northern wing is 70 feet by 60 feet, and contains store rooms for heavy hardware.

On the east side of the yard is the building known as "The east workshops, 208 feet by 46 feet and three storeys in height, on the ground floor of which are carpenters' and tinsmiths' shops, machine shop, engine room and drying kiln, on the second floor a carpenters' shop and paint shop, and on the third floor a tailors' and shoemakers' shop. Adjoining this is a one storey building 107 feet by 40 feet used as a blacksmiths' shop and wash-house.

The north lodge is 79 feet by 46 feet, one and a-half storeys in height, occupied as a store room, office, guards' room, and armoury. The west lodge, which is the same number of storeys, is 53 feet by 40 feet, and is the residence of two officers.

To the south of the east workshop is a half-storey stable and coach house furnishing accommodation for sixteen horses and two carriages.

In the south-east angle of the yard there is a coal house, capable of containing 1,200 tons.

The Warden's residence is situated on a lot of land 4 acres in extent, on a high elevation directly opposite the entrance to the main prison (which it overlooks) and 64 feet by 44 feet, two storeys and basement, of dressed stone, with a vinery and greenhouse attached to it, the former 64 feet by 13 feet 6 inches, and the latter 53 feet by 9 feet 6 inches, while adjoining these buildings is a stable and coach house 53 feet by 24 feet, one and a half storeys in height, and a wood shed with covered way, 60 feet by 21 feet, the roofs of all these buildings being covered with metal.

The Farmer's dwelling is about one half a mile north of the penitentiary, built of stone, 30 feet by 30 feet, one and a-half storey high, roof covered with shingles; adjoining it are three barns, two wooden and one stone, (with roofs covered with shingles), the former each 48 feet by 36 feet, and the latter 110 feet by 40 feet, having root cellars in basements.

The ice house, a one storey wooden building at wharf, is 53 feet by 31 feet, with a filter house adjacent to it, 22 feet by 22 feet.

The coal store is a one storey wooden building, on wharf, 56 feet by 26 feet.

The sawmill is at the north of wharf and of wood, one storey, 80 feet by 20 feet.

In 1867 an additional lot, one-third of a mile from the prison, adjoining the penitentiary property, and containing 17 acres, 1 rood and 39 perches, was purchased from the Bank of Upper Canada for quarry purposes. Between the quarry and stonecutters' shop at prison, a tramway was erected for conveyance of material. In the quarry is a lime-kiln, with a capacity of 1,200 bushels, and adjoining it a wooden lime-house 40 feet by 40 feet.

By Order in Council, 17th November, 1874, all the above buildings and properties were placed under the charge of this Department, by which the following works have been designed and executed.

The hospital is to the eastward of the prison, two storeys and basement, 124 feet by 60 feet, with cut stone walls and metal roof covering; the basement contains heating apparatus, fuel room and dead house; the ground floor—guard room, bath room, store room, kitchen, and twenty-four cells, each 9 feet by 5 feet, by 14 feet in height; and, on the first floor are the surgery, the keeper's room and twelve cells.

Eastward of the prison is the dining hall, a cut stone building, two storeys and basement, with the roof covered with metal, 125 feet by 66 feet; in the basement are the bakery and storerooms, on the ground floor the dining hall, and on the first floor the Protestant chapel and schools; adjoining is a kitchen, one storey and basement, 54 feet by 32 feet, containing in basement the steam cooking apparatus, and the ground floor the kitchen.

The lunatic asylum for convicts is a three storey cut stone building, with roof covering of metal, the north half of which is 170 feet by 53 feet. The basement contains fourteen solitary cells, boilers for heating the building and a fuel room, and the ground, first and second floors contain each fourteen cells, making, with the basement, a total of 56 cells. On the third floor is the patients' day room, 73 feet by 44 feet while on each floor are lavatories, baths and water closets. In the south half of the building, which contains the asylum, the ground and first floors are used as grist mill. The floors throughout this building are constructed of wrought iron joisting, with brick arches between, covered with sandstone flagging. Construction was commenced in 1875 and completed in 1880.

In 1881 an extension of 70 feet by 60 feet was made to the north wing of the extension of south workshops of two storeys and basement with constructive materials same as the original building. A portion of the basement, 54 feet by 25 feet, is vaulted in stone and provides storage for coal, above which, on the ground floor, is storage for heavy hardware, the boiler house, 54 feet by 27 feet, occupying the remainder of the basement and the ground floor. In the boiler house are placed six steam boilers and two steam pumps. The floors are constructed of iron joists and brick arches, covered with oak flooring. Cut stone ducts, 6 feet by 3 feet, containing steam mains, lead from the boiler house to the various buildings.

Outside of the boundary wall (which forms the rear of the building) is a wooden structure 119 feet by 16 feet for the storage of lumber.

The farm labourers' quarters are in a two storey and basement stone building 65 feet by 30 feet with wooden roof, at a distance of one mile from the prison. In the vicinity of this building is a stone barn 110 feet by 40 feet with root cellar, etc.

In the vicinity of the farmer's house are the piggeries, of cut stone, 56 feet by 24 feet, with a low building 200 feet by 12, for pens, and having a capacity for raising 100 hogs per annum.

In 1877 an additional lot of land on the west side, adjoining the old farm, and 106 acres in extent, was purchased and has been fenced.

A part of the south east wharf, 254 feet in length, by 5 feet in height, was rebuilt in 1881.

A breakwater, 200 feet by 30 feet, is in course of construction, to form a basin 100 feet square.

MILFORD, (PRINCE EDWARD COUNTY.)

DRILL SHED.

Shed of wood, 70 feet by 50 feet, with armoury attached, 48 feet by 8 feet; both in need of repairs.

It is situated on Lot 25, Spring street, and was erected in 1871.

BELLEVILLE.

POST OFFICE, CUSTOM HOUSE, ETC.

A site for the above, with a frontage of 103 feet on Bridge street, and 116 feet on Pinnacle street, was purchased in 1830-81, and during the past year a contract for the building has been entered into, and the work of construction is now in progress.

The external walls of the building will be brick, with stone dressings, and the foundations stone; floors and roofs will be of wood.

There will be a ground floor for the local Post Office and Weights and Measures offices; a first floor for the Custom House and Inland Revenue offices, and an unfinished attic.

Brick safes are to be provided for the several departments.

The frontages on Bridge and Pinnacle street will be 65 feet and 74 feet respectively, with an entrance for the Post Office on the former, and for the Custom House and Inland Revenue Offices on the latter.

Architect—Mr. R. C. Windeyer.

TRENTON.

DRILL SHED.

A wooden drill shed, 84 feet by 42 feet, situated on Market Square, built in 1869 and now in a dilapidated condition.

ODESSA.

DRILL SHED.

A wooden building 132 feet by 48 feet, with orderly room 40 feet by 20 feet, and armoury 20 feet by 8 feet; situate on east half Lot 31, Con. 4, Township of Earnestown.

Built in 1869 and now in a fair state of repair.

COLDSPRINGS (NORTHUMBERLAND COUNTY.)

DRILL SHED.

1. Shed 80 feet by 48 feet, with armoury 19 feet by 12 feet attached; situated on Lot 16, Con. 5, in the Township of Hamilton. Erected in 1870 and now in good condition.

COUNTY OF PETERBOROUGH.

DRILL SHED.

1. *Peterborough*.—A shed 144 feet by 80 feet, with orderly rooms, store rooms and rooms and caretaker's quarters, situated on north side of Murray street, west of George, and is in good order. Built in 1867.

2. *Ashburnham*.—A shed 80 feet by 46 feet, with armoury 30 feet by 14 feet, both in good order; situated west of Lake street and south of Elizabeth street, now in good condition. Built in 1868.

3. *Norwood*.—Shed 80 feet by 46 feet, with armoury detached, 20 by 18, erected on lot 20, Queen street, in the year 1869, now in good condition.

4. *Hastings*.—Shed 80 feet by 50 feet, with detached armouries, 16 feet square, situated on Elizabeth street, lot 4, concession 7, Township of Asphodel. Erected in 1869, and now dilapidated.

COUNTY OF DURHAM, ONT.

DRILL SHEDS.

1. *Bowmanville*.—A wooden shed, 120 feet by 80 feet, with lean-to armoury, 70 feet by 15 feet, on east side, situated on Centre street. Erected in 1868 and now much in need of repairs.

2. *Springville*.—A shed 80 feet by 45 feet, with armoury 18 feet by 10 feet, at west end, standing on the north-east corner of lot 23, concession 10, in the Township of Springville, and is in fair repair. Built in 1868.

3. *Janetville*.—Wooden shed of regulation size, situated at south-west part of lot 26, concession 13 of the Township of Manvers, and was erected in 1869. Now somewhat dilapidated.

4. *Port Hope*.—Shed 160 feet by 90 feet, with a store, band room and armoury 90 feet by 18 feet attached. Built in 1868 and now in a fair state of repair.

5. *Kendal*.—A wooden building 100 feet by 50 feet, with armoury 16 feet by 12 feet attached, situated on Lot 9, Clark and Church streets. Erected in 1874, and now in need of repairs.

6. *Manvers*.—This is a wooden building 85 feet by 60 feet, in a dilapidated condition, situated between lots 11 and 12, concession 9, Township of Manvers.

COUNTY OF VICTORIA, ONT.

DRILL SHEDS.

1. *Omamee*.—A wooden building 90 feet by 50 feet with armoury and orderly rooms 22 feet by 12 feet attached, situated on the south half of lot 6, George street, and is in need of repairs. Built in 1868.

2. *Lindsay*.—Shed of wood, situated on the corner of Trent and Victoria streets. Built in 1868.

COUNTY OF ONTARIO, ONT.

DRILL SHEDS.

1. *Whitby*.—A battalion shed, of wood, 145 feet by 82 feet, with armouries, etc., 72 feet by 16 feet attached. It is situated on the corner of Byron and Trent streets, and is in good condition. Built in 1868.

2. *Oshawa*.—A wooden shed 100 feet by 65 feet, with armoury 30 feet by 12 feet, on a lot 150 feet by 96 feet, situated on corner of Albert and King streets. Built in 1868, and now in need of repairs.

3. *Brooklyn*.—A wooden building 80 feet by 50 feet, situated on Durham street, on lot 24, concession 6. Built in 1868, and in tolerably good condition.

4. *Columbus*.—Shed 80 feet by 50 feet, and armoury attached, 20 feet by 12 feet, situated on lot 15, east side of Simcoe street, and in fair condition. Built in 1868.

5. *Cannington*.—A drill shed 78 feet by 48 feet with an armoury 15 feet by 15 feet, situated on Munro street, on a lot which contains one-half acre. Built in 1868 and now in fair order.

6. *Greenwood*.—A wooden shed 80 feet by 50 feet with armoury at north end, 24 feet by 11 feet, situated on lots ten and eleven, concession six, township of Pickering, built in 1868 and now in bad state of repair.

7. *Beaverton*.—A wooden building 80 feet by 48 feet with an armoury attached 9 feet by 11 feet, both in a good state of preservation, situated on Osborne street, and erected in 1872.

COUNTY OF SIMCOE, ONT.

DRILL SHEDS.

1. *Barrie*.—A wooden battalion shed, 145 feet by 85 feet, with armoury 15 feet by 8 feet, storeroom and caretaker's rooms attached, all in an unsound condition. The building is situated on the east side of Small street and the southwest corner of the Town Park. Built in 1868.

2. *Cookstown*.—A shed, 85 feet by 65 feet, with an armoury 22 feet by 16 feet attached, situated on Lot 1, Concession 1, of the Township of Innisfil, and in good condition. Built in 1868.

3. *Orillia*.—A stone shed, with a wooden addition for caretaker's quarters, situated on Andrew street. Erected in 1868, and now in good condition.

4. *Bradford*.—A wooden building, 84 feet by 42 feet, with a lean-to armoury, 16 feet by 12 feet, and is much dilapidated. It was built in 1868 on part of Lot 15 Simcoe street.

5. *Collingwood*.—Shed, 112 feet by 61 feet, in good condition, with attached armoury dilapidated, situated on Lot 36, corner of West and Maria streets. Erected 1867.

6. *Bondhead*.—Shed of wood, 80 feet by 46 feet, with armoury attached 20 feet by 16 feet, erected in 1868, and now in good condition.

TORONTO.

OLD FORT.

The buildings in connection with this work were received over from the Royal Engineer's Department by the Dominion Government of Canada on the 26th September, 1870.

1. *Married Quarters*.—A wooden one storey building, with a stone foundation 80 feet by 34 feet, much dilapidated.

2. *Married Quarters*.—A one storey wooden building 70 feet by 30 feet, badly dilapidated.

3. *Two Ranges of Cottages (Married Quarters)*.—Three cottages in each, one storey, brick, with wooden roof; each range 100 feet by 20 feet, woodwork generally out of repair.

4. *Hut Barracks*.—A one storey wooden building, 92 feet by 27 feet; generally in a serviceable condition.

5. *Soldiers' Barracks*.—A wooden two storey building with a stone basement consisting of a main building 72 feet by 40 feet, with two wings 40 feet by 45 feet each; attached is a wooden one storey ablution room 16 feet by 22 feet; both buildings in a bad state of preservation.

6. *Large Block House*.—A two storey wooden building, on a stone foundation, 5 feet by 40 feet, slightly out of repair. In the rear of this is a barrack store building of wood, 55 feet by 15 feet, entirely dilapidated.

7. *Block House*.—A wooden building 40 feet square, two storeys, resting on stone foundation; it is now used as a harness room, and is in a fair condition.

8. *Magazine*.—A one storey stone building with tin covered roof, 30 feet by 3 feet.

9. *Artillery Store*.—A two storey brick roughcast building 30 feet by 35 feet dilapidated generally.

10. *Canteen*.—A wooden one storey building 40 feet by 20 feet; dilapidated.

11. *Cook House*.—One storey wooden building 25 feet by 30 feet; in bad state of repair.

12. *Armourers' Shop*.—A one storey brick building with wooden roof; size, 30 feet by 15 feet; woodwork decayed.

13. *Ablution Room*.—A wooden one storey building, 35 feet by 15 feet; in fair condition generally.

14. *Offices*.—A one storey brick building with stone cellar and wooden roof; in very bad condition generally.

In addition to those enumerated, there is a number of latrines, urinals and privies, dilapidated and otherwise not worthy of special mention.

NEW FORT.

This property was surrendered to the Dominion Government by Commanding Officer Royal Engineers in Canada on 15th July, 1870.

1. *Officers' Quarters*.—A stone building, with slated roof; two storeys and basement; 150 feet by 45 feet; wood work decayed, otherwise in good order; stone latrines in rear.

2. *Barracks*.—A one story wooden building, 218 feet by 40 feet, much dilapidated.

3. *Barrack Huts*.—A stone building with tin covered roof, 120 feet by 35 feet, with accommodation for four officers and sixty-four men. It is in good condition.

4. *Huts for Married Men*.—A wooden building, 40 feet by 60 feet, in a dilapidated condition.

5. *Block of Three Huts*.—Of wood, one storey in height, 90 feet by 30 feet; well reserved.

6. *Latrines Adjoining Above*.—1 storey, wood; good repair.

7. *Huts for Men*.—A one storey wooden building, 80 feet by 40 feet, with accommodation for four non-commissioned officers and fifty-six men; is in good condition.

8. *Soldiers Quarters*.—A stone two storey building, with tin covered roof; size, 65 feet by 100 feet; general condition good.

9. *Magazine*.—One storey stone building, with roof covering of tin; size, 12 feet square; wood work decayed.

10. *Cook-House*.—One storey, wood; size, 20 feet square.

11. *Canteen*.—A two storey stone building, with tin roof covering; size, 45 feet by 50 feet; in fairly good order.

12. *Officers' Stable and Latrines*.—A stone one storey building, with tin covered roof with accommodation for five horses.

13. *Officers' Stable*.—One story stone building, with tin roof covering, slightly out of repair, size 40 feet by 20 feet.

14. *Stabling, etc., for Field Battery*.—These are wooden one story buildings, one with seventy-eight stalls, two with sixty stalls each, one with seven stalls and three for box stables, and a gun shed, also a (brick) harness room, a shoeing shed and workshop, woodwork much decayed.

15. *Royal Artillery Hospital*.—Stone building with slate roof, covering two storeys with a one storey wing, in good state of preservation, size 36 feet by 60 feet.

16. *Ablution House*.—One storey brick building with stone foundation and shingle roof, size 28 feet by 20 feet, well preserved.

17. *Shoemakers' and Tailors' shop*.—A one story frame building, 90 feet by 30 feet, good condition.

18. *Provosts Cook-house*.—A stone one story building with tin covered roof, size 15 feet by 15 feet, in good condition.

19. *Meat House*.—A stone two story building with tin covered roof, size 80 feet by 40 feet, in good condition and with various outbuilding.

20. *Prisoners' drill shed and armourers shop attached*. One story wooden building 55 feet by 18 feet, with a stone armourers' shop with tin covered roof, both in good condition.

21. *Forge house and stores*.—A wooden one storey building much decayed.

22. *Guard room and harness room*.—A wooden one story building, dilapidated.

MILITARY CEMETERY BUILDING.

These were transferred to the Dominion Government by the Commandant Royal Engineer's in Canada on the 26th September, 1870, and comprise (1) a magazine of

posts and planks, banked and covered with earth, now in good order. (2) A one story wooden storehouse somewhat decayed. (3) A wooden gun and carriage shed dilapidated. (4) wooden office or storekeepers house, one story, roughcast outside in good condition and (5) an armourers' shop of wood one story in height, in a good state of preservation.

INLAND REVENUE OFFICES.

This building, formerly used as a Post Office, (described in Report of Commissioner of Public Works, 1867), was vacated on the completion of the present Post Office in 1873-74, when it was fitted up for the Assistant Receiver General's and Inland Revenue Offices. These alterations, etc., were completed in 1874-75.

Building warmed by steam; gas and water from the city services.

Architect—Mr. Henry Langley.

POST OFFICE.

During the fiscal year, 1870-71, a site was acquired fronting on Adelaide street immediately opposite the end of Toronto street, and extending back to Stanley street 120 feet by 180 feet.

A contract was signed on the 16th March, 1871, for the construction of the building, which was completed and occupied during 1873-74.

The building has a frontage of 75 feet, and extends the full depth of the lot. The front wall and a 12 feet return on each of the side walls are of stone, and the remaining external walls are brick, facing bricks being white; roof of wood, covered with slates and galvanized iron.

There is a basement 137 feet by the width of the building, and a ground floor which extends throughout, while the front portion of the building for a depth of 10 feet is carried two storeys higher. In the basement is accommodation for heating boilers, fuel, etc.

The ground floor accommodates the local Post Office; the first and second floors have Postmaster's and Inspector's Offices, etc.; brick safes are provided on ground floor.

The style of architecture is modern classic. The front elevation has the centre and two ends slightly projected; each storey is strongly marked by moulded dentel cornices. The wall surface is divided vertically between openings in the centre portions by columns and in the end projections by piers.

The roof on front elevation is broken by a central dome containing a clock and two truncated angle pavillions.

Warming is by steam. Gas and water from city services.

Architect, Mr. Henry Langley.

CUSTOM HOUSE.

The Custom House built in 1846 (described in the Report of the Commissioner of Public Works, 1867) was found unsuitable and deficient in accommodation, and a contract was entered into during 1872-73 for the construction of a new building on the original site on the corner of Yonge and Front Streets, which building was completed and occupied in 1876-77.

The new building is in the Italian Renaissance style of architecture. It faces Front street, on which it extends 63 feet, and on Yonge street 112 feet.

The walls of basement are of stone from Georgetown, Ont., and those of the superstructure of Ohio stone.

The Front street elevation is divided vertically into three bays by pilasters and columns richly carved and moulded, the centre bay, containing the principal entrance, being slightly projected and carried up, breaking the roof and finishing with a classical pediment; horizontally the floor lines are marked by moulded and carved strings and cornices which are carried round the principal fronts.

The roof is constructed of wood, covered with slate and galvanized iron.

Floors of wood.

Brick safes are provided for the various branches.

There is a basement, a ground, a first, a second and an attic floor, the latter unfinished.

The basement contains boiler and fuel rooms, store rooms, etc. On the ground floor are the guagers', lockers', landing-waiters', surveyors' lavatories, etc. The first floor is the long room, collectors' clerks' and messengers' offices, lavatories, etc. On the second floor are the caretaker's quarters.

The long room is 60 feet by 40 feet, and 40 feet in height, the finish being highly ornate.

The building is warmed by steam and has gas and water throughout.

Architect, Mr. R. C. Windeyer.

EXAMINING WARE HOUSE.

This building is situated in the rear of the Custom House with frontages of 115 feet on Yonge Street and 86 feet on Esplanade Street. It is four storeys in height. The walls are brick with foundation of stone.

Window heads are circular, enclosing two openings and a medallion in the panel.

Floors are of iron and brick, covered with wood, supported on iron columns and girders; ceilings of corrugated iron.

The style of architecture is simple in character and the building has a solid and substantial appearance.

It contains a steam hoist for elevating and lowering merchandise.

Buildings heated by steam.

Gas and water supplied from the city services.

Architect, Mr. W. Irving.

IMMIGRANT BUILDINGS.

This depot is situated at the east of Strachan avenue on a plot of ground 6½ acres in extent; bounded on the north by the Grand Trunk Railway track, and on the south by the Great Western Railway track.

The buildings are of wood, viz.:

- (1.) A landing and sleeping shed two storeys in height.
- (2.) A dining hall, having cook house and store and cellarage attached.
- (3.) Ticket office and messengers' dwelling.
- (4.) Baggage shed.
- (5.) Wash house, tank and pump.
- (6.) Latrines.

Plans and specifications prepared by this Department.

MAGNETICAL OBSERVATORY.

This building has been described in detail in the Report of the Commissioner of Public Works for 1867.

COUNTY OF YORK, ONT.

DRILL SHEDS.

1. *Sharon*.—A wooden building, 82 feet by 46 feet, with an armoury 40 feet by 7 feet attached, situated on Lot 9, Concession 3, Township of Gwillimbury. It was erected in 1868, and is in a good condition.

2. *Sutton*.—Shed 82 feet by 47 feet, with armoury and clothing rooms at end, situated on a quarter-acre lot, a part of Block 8, Concession 7, Township of Georgina; in fair condition. Erected in 1869.

3. *Toronto*.—The drill shed is of brick, 160 feet by 100 feet, somewhat out of repair; it has armouries, stores, orderly rooms and officers' rooms attached. It is situated between East and West Market streets, and was erected in 1877.

COUNTY OF HALTON, ONT.

DRILL SHEDS.

1. *Acton West*.—A wooden building, 80 feet by 46 feet, with armoury 16 feet by 12 feet, at south end; situated on the corner of Bower and Elgin streets. Built in 1868 and now in good condition.

2. *Stewartown*.—The shed is 80 feet by 50 feet, including an armoury 15 feet by 10 feet. It is situated on lot 15, 8th concession of Esquesing, and was built in 1868; now in good condition.

3. *Nelson*.—A 50 feet by 80 feet wooden shed, in a good state of repair situated on a lot 100 feet by 80, on Dundas street, in concession 2, Township of Nelson. Erected in 1868.

4. *Nassagaweya*.—A wooden shed 80 feet by 50 feet, including an armoury situated in concession 2, Township of Nassagaweya. Built in 1868 and in a fair state of preservation at present.

5. *Georgetown*.—A wooden building, 80 feet by 48 feet, with an armoury 16 feet by 10 feet attached; situated on part of lot 43, east of Market street. Built in 1868, and now in a fair condition.

6. *Norval*.—A wooden shed, 80 feet by 46 feet, in good condition; erected in 1870.

STREETSVILLE (COUNTY OF PEEL.)

DRILL SHED.

A wooden building, 80 feet by 40 feet, resting on stone piers, erected in 1868 and now in a dilapidated condition.

COUNTY OF WENTWORTH, ONT.

DRILL SHEDS.

1. *Dundas*.—A wooden shed on stone foundations, 100 feet by 60 feet, with an armoury, a band room and a clothing room attached, all in need of repair excepting the armoury. This building is situated on the easterly part of Lot 24, between King, Market Hall and Militia Streets, and was built in 1868.

2. *Benbrook*.—A shed 80 feet by 40, with armoury 20 feet by 14 feet attached, situated on Lot 1, Concession 3, Block 4, in the Township of Benbrook. It was erected in 1868 and is now in a good state of repair.

3. *Watertown*.—Size of shed, 80 feet by 48 feet, with an armoury 17 feet by 12 feet attached, both in a fair condition, situated on Lot 7, Concession 3, Flamborough on the east side of Main Street, and south of Dundas Street. Erected in 1868.

4. *Stony Creek*.—Shed of wood 80 by 48 feet, with armoury 14 feet by 12 feet attached, both in good condition, situated on lot 24, Con. 4, in the Township of St. Catharines, and erected in 1873.

5. *Hamilton*.—A wooden shed 213 feet by 80 feet with brick armouries (attached to North side) 19 feet by 13 feet, situated on the east side of James Street between Common and Robert streets, erected by Corporation of the City of Hamilton and purchased by the Dominion Government in 1877.

It is now in need of repairs.

HAMILTON.

CUSTOM HOUSE.

Was fully described in the Report of Commissioner of Public Works, 1867. Essential repairs only have been executed since the last mentioned date.

POST OFFICE.

The original building was described in the Report of the Commissioner of Public Works 1867.

An addition was made in 1872-73 in keeping with the existing work, the business having been largely increased.

Warming is by hot air furnaces; gas and water supplied from the city services. Architect, Mr. F. J. Rastrick.

ST. CATHARINES.

POST OFFICE, CUSTOM HOUSE, ETC.

A building site with frontages of 80 feet and 154 feet on Queen and King streets respectively, was secured in 1880-81, and a building is now in progress with a frontage of 62 feet on Queen street and 64 feet on King street.

The walls are to be brick (with stone dressing and portico) resting on a stone foundation and with wooden floors and roof; roof covering to be galvanized iron on flats and slates on slopes.

There is to be a basement containing heating apparatus, fuel rooms and store room; a ground floor occupied by the Post Office, a first floor devoted to the Custom House and Inland Revenue, and an unfinished attic.

Brick safes will be provided for the various departments. The Post Office entrance is to be on King street, and that of the Custom House on Queen street.

Architect, Mr. R. C. Windeyer.

NIAGARA BARRACKS AND HOSPITAL

These properties were handed over to the Provincial Government of Canada by the Imperial Authorities in 1856.

1. *Large Barracks*.—A two storey building on a stone foundation, having walls of logs on first storey and of frame brick-nogged above. It is 80 feet by 26 feet, covered with a wooden roof, and now in a fair condition.

2. *Men's Cook-House*.—A one storey log building on a stone foundation, 40 feet by 15 feet, and now in a good condition.

3. *Mess Room and officers' Quarters*.—A one story frame building, brick-nogged and clapboarded, 120 feet by 30 feet, and with stone wine-cellars attached; all now in good condition.

4. *Barrack Stables*.—Two frame buildings clapboarded and with shingle roofs; each one storey and loft; 84 feet by 46 feet, and in fair condition.

5. *Wash-house*.—A one storey wooden building, now occupied as a dwelling and in poor state of repair.

6. *Staff Sergeants' Quarters*.—A one and a-half storey log and clapboarded building with a two storey orderly room attached, both in fair condition; size, about 30 feet by 30 feet.

7. *Wash-house, (now a Stable)*.—One storey, clapboarded, 24 feet by 18 feet, on a socket foundation and generally dilapidated.

8. *Officers' Stables*.—A one storey frame and clapboard building, 60 feet by 16 feet.

9. *Commissariat Office, store and Barrack rooms*.—A two storey and basement frame and clapboard building, with stone foundation, 60 feet by 30 feet.

10. *Gun-shed now Store-house*.—A one storey frame and clapboarded building, 96 feet by 24 feet, on a stone foundation, and in need of repairs.

11. *Provision Store-house*.—A one storey frame and clapboard building, 41 feet by 11 feet, on cedar posts and in good condition.

12. *Commissariat Quarters*.—A part brick and part wooden, one storey, and one storey and a-half, having stable and coach house adjoining, all in a good state of repair.

13. *Barrack Master's Quarters*.—A one storey frame and clapboard building, in good state of preservation, with a good log stable and coach-house adjoining.

14. *Commandant's Quarters*.—Burned in 1858.

15. *Garrison Hospital*.—Burned in 1880.

PORT MISSISAGUA.

This is an earthwork, inclosing the following buildings, viz. :—

1. *Block House*.—Brick, one storey building about 50 feet square, with a flat roof consisting of two rooms, and now in a ruinous condition.

2. *Magazine*.—A brick building, 16 feet 6 inches by 11 feet 6 inches, and one storey in height.

3. *Quarters for officers and men*.—Five log buildings, each 14 feet wide, one which is 27 feet long, two 60 feet, one 45 feet, and one 100 feet, all in a ruinous condition and beyond repair.

PORT DALHOUSIE.

CUSTOM HOUSE AND CANAL OFFICE.

This building is situated at St. Catharines, and was fully described in the Report of the Commissioner of Public Works, 1867.

COUNTY OF WELLAND, ONT.

DRILL SHEDS.

1. *Fenwick*.—A wooden shed 80 feet by 40 feet, situated on lot 16, concession in the township of Pelham.

2. *Fort Erie*.—A wooden shed 84 feet by 44 feet, in a fair condition, situated the corner of Princess and Victoria streets. Erected in 1868.

COUNTY OF HALDIMAND, ONT.

DRILL SHEDS.

1. *York*.—A two company wooden shed 100 feet by 60 feet, in good repair, situated on the corner of King and Albion streets and were erected in 1868.

2. *Caledonia*.—A wooden shed 100 feet by 50 feet with two armouries, each by 12 feet attached, in a good state of repair. It is situated between Caithness street and the river and was built in 1863.

3. *Hagersville*.—A wooden shed 81 feet by 51 feet with armoury attached, 16 feet by 12 feet, both in good condition. It is situated on Lot 13 in the Township of Wapole.

4. *Hullsville*.—Shed 100 feet by 50 feet, with armouries 44 feet by 7 feet, all in good repair, situated on Lot No. 41, Berthier Street; and was erected in 1868.

5. *Cheapside*.—A wooden shed 85 feet by 25 feet, with an armoury 15 feet by 12 feet attached, both in want of repair, situated on Queen street and erected in 1868.

6. *Cayuga*.—Drill shed 80 feet by 48 feet, with armoury 16 feet by 10 feet, in good condition. Erected in 1877.

SIMCOE, (COUNTY OF NORFOLK.)

DRILL SHED.

A wooden shed, 100 feet by 50 feet, built in 1868.

BRANTFORD.

POST OFFICE, CUSTOM HOUSE, ETC.

This building is on the corner of George and Dalhousie streets, extending 62 feet on former and 53 on latter.

The walls of the building are brick on a stone foundation, and there are basement, ground, first and attic floors.

The basement furnishes accommodation for boiler and fuel rooms and closets.

The ground floor is the post office, the second floor is occupied by the Customs and Inland Revenue Offices, and the attic is finished as caretaker's rooms.

The weights and measures office is accommodated in a one story brick building in yard.

Heating of building by steam; gas and water from the city services.

Plans, etc., prepared by this department. Superintending architect, Mr. John Henry.

COUNTY OF BRANT.

DRILL SHED.

1. *Brantford*.—A wooden shed 150 feet by 90 feet, with armoury 18 feet by 9 feet and caretakers quarters, 54 feet by 18 feet attached, all in good condition. It is bounded by Colbourne, Canning, Dalhousie and Peel streets, and was erected in 1868.

3. *Burford*.—A wooden shed 80 feet by 44 feet, with an armoury 44 feet by 16 feet attached, erected on the Hamilton and London road, on lot No. 3, concession 7, in the township of Burford. It is in need of repair. Erected in 1868.

COUNTY OF WATERLOO, ONT.

DRILL SHEDS.

1. *Cross Hill*.—The shed is of wood 80 feet by 46 feet, and the armoury, which is at the south of shed, is 48 feet by 3 feet. Built in 1868; wooden foundation decayed.

2. *Hespeler*.—A frame building vertical boarded and battened, with shingled roof, 80 feet by 48 feet, with an armoury 16 feet by 12 feet, situated on George street. Built 1869, and now in fair condition.

3. *Berlin*.—A wooden shed and armoury 150 feet by 66 feet erected on the eastern side of Queen street 1-2 mile from centre of town on park grounds, the property of the Municipality. Erected in 1868.

GUELPH.

POST OFFICE, CUSTOM HOUSE, ETC.

A site was procured for this building at the intersection of Wyndham and Douglas streets, facing St. George's Square. A contract for construction was entered into in 1873-74 and the building completed during the fiscal year 1877-78.

The external walls are of local stone and the internal walls of brick. The building covers an area of 2,800 feet and is two stories in height exclusive of basement and attic.

Basement floor is appropriated for Examining Warehouse, fuel room and closets. The ground floor contains the Post Office and the first floor is occupied by the Customs and Inland Revenue Offices.

Brick safes are provided for the Post Office.

Building heated by stoves. Gas and water from the city services.

Plans, etc., prepared by this Department.

COUNTY OF WELLINGTON, ONT.

DRILL SHEDS.

1. *Hallen*.—A frame building, 80 feet by 48 feet; erected in 1868, on Main street, lot 17, concession 6, Maryborough, and is now in fair condition.

2. *Guelph*.—This is a stone building, 70 feet by 35 feet; erected in 1876 on the agricultural grounds; now in good condition.

3. *Erin*.—A wooden building, 80 feet by 48 feet, on the west side of Main street, a part of the east half of lot 15, in the 9th concession of the Township of Erin, and parts of village lots 11 and 13 with all of 12. Built in 1868, and now in a fair state of repair.

WHITTINGTON, (COUNTY OF DUFFERIN.)

DRILL SHED.

Size of shed, 80 feet by 46 feet, with an armoury 14 feet by 10 feet; erected in 1868, and now in a bad state of repair. It is located on lot No. 16, concession 1 Amaranth.

COUNTY OF PERTH, ONT.

DRILL SHEDS.

1. *Stratford*.—Shed 150 feet by 80 feet; situated on lots 224 and 557, fronting on Albert and Brunswick streets. Built in 1869, and now in good condition.

2. *Blanchard*.—A frame building, 81 feet by 219 feet, in a very bad state of repair; erected on lot 16, 14th concession, East Mitchell Road, in the year 1869.

COUNTY OF HURON, ONT.

DRILL SHEDS.

1. *Exeter*.—A wooden shed 80 feet by 50 feet, with an armoury 20 feet by 10 feet, erected on part of Lot 18, Concession 1, Usborne, in the year 1868, and is in a fair state of preservation.

2. *Dungannon*.—Size 80 feet by 48 feet, with site of same size. Erected on St Joseph street in 1869 and now in good condition.

3. *Bayfield*.—Of wood, 85 feet by 45 feet, with an armoury 18 by 14 feet attached the site is $\frac{1}{4}$ acre in extent fronting on Market Square. Built in 1868 and now somewhat dilapidated.

4. *Gorrie*.—A wooden building 80 feet by 48 feet, and now much out of repair. It is situated on the corner of John and Wellington streets, and was built in 1869.

5. *Porter's Hill*.—Shed 80 feet by 46 feet and armoury 20 feet by 14 feet, situated on Lot 26, Concession 7, Township of Goderich. Built in 1871 and now in fair condition.

6. *Clinton*.—A wooden building 80 by 46 feet, with an armoury in rear 20 feet by 10 feet, both in fair condition. Erected in 1871 on Orange street.

COUNTY OF GREY, ONT.

DRILL SHEDS.

1. *Owen Sound*.—A wooden shed, 100 feet by 50 feet, in a fair state of preservation, situated on the southwest corner of the Public Pleasure Ground; built in 1880.

2. *Meaford*.—Shed 80 feet by 46 feet, with armoury 29 feet by 12 feet, situated on lot 20, Collingwood street, Market Square, which is 102 feet by 80 feet; erected 1869, and now in good order.

3. *Annan*.—Drill shed and armoury in a wooden building 60 feet by 40 feet which is in a fair state of preservation; erected on lot 34, concession C, in township of Sydenham, in the year 1875.

4. *Clarksburg*.—A shed 80 feet by 48 feet, with armoury, 16 feet by 12 feet, attached, both in tolerably good repair; erected on the east side of William street, and south side of Clark street, on Lot 30, Concession 10, Township of Collingwood, in the year 1869.

5. *Flesherton*.—A wooden one company shed, regulation size, situated on Lot 150, Range 1, east of Toronto and Sydenham Road; erected in 1869, and now in good order.

6. *Dunham*.—A wooden shed 80 feet by 50 feet, erected on Lot 24, Division 2, east of the Garafraxa Road, in 1867, and now in good condition.

COUNTY OF BRUCE, ONT.

DRILL SHEDS.

1. *Walkerton*.—A shed, 144 feet by 80 feet, in a good state of repair; erected on Lot 1, east side of Victoria street, in the year 1870.

2. *Southampton*.—Shed 60 feet by 200 feet, with armoury in rear 20 feet by 12 feet, situated on a lot containing one-sixth acre at the corner of High and Albert streets.

3. *Teeswater*.—Shed 80 feet by 40 feet, situated on a lot containing one-fifth acre on Marvey street, built in 1874, and now in fair condition.

LONDON.

POST OFFICE.

The original building has been fully described in the Report of the Commissioner of Public works, 1867.

During 1870-71 an additional piece of land was acquired to increase the yard room, and in 1873-74 an addition to the building was made which furnished accommodation for sorting of letters, and a dwelling for the caretaker.

Building heated by stoves, gas and water from the city services.

Plans, etc., prepared by this Department. Superintending architect, Mr. Wm. Robinson.

CUSTOM HOUSE.

The site chosen for this building is in the central portion of the City, at the intersection of North and Richmond streets. It was purchased in 1869-70 and in the same year a contract entered into for the construction of the building which was completed in 1873-74.

It consists of a main building three stories in height, covering an area of 30,509 feet, and a one story annexe for examining warehouse, covering an area of 1,204 feet. Walls are Ohio stone; internal walls of brick; roof of wood covered with galvanized iron on deck and slate on slopes.

The architecture is modified Italian. The basement furnishes rooms for the caretaker, and the remaining floors are used as offices for Customs and Inland Revenue.

Warming is by steam; gas and water supplied from city services. Architect Mr. Wm. Robinson.

MILITIA BUILDING.

Grounds were fenced in and wooden outbuildings erected in 1876-77.

IMMIGRATION SHED.

Is situated on a wedge shaped lot, three and one-half acres in area, lying between the lines of the Grand Trunk and Great Western Railways, a mile from the city of London.

It is two stories in height, constructed of wood on a stone foundation, and covers an area of 2,808 square feet.

Buildings warmed by stoves. Architect, Mr. Wm. Robinson.

COUNTY OF MIDDLESEX, ONT.

DRILL SHEDS.

1. *City of London*.—Two brick sheds and armouries, one 113 feet 6 inches by 77 feet; in good condition; situate on Central avenue and Wellington street, on Dominion Government property; the other, 143 feet by 43 feet, located in the centre of Militia grounds; both built 1864.

2. *Strathroy*.—A white brick shed 50 feet by 20 feet, on a lot of same size, situated on north side of Market Square, and is in good condition. Erected 1868.

3. *Lucan*.—Shed 60 feet by 40 feet, with armoury 20 feet by 14 feet; both of wood and in bad repair; erected on lot 154, in the year 1871.

4. *Harrietsville*.—A wooden building 60 feet by 24 feet, with armoury over, situated on lot No. 12, concession 5, township of Dorchester. Building erected in 1868.

5. *Park Hill*.—A wooden shed and armoury, the former 80 feet by 44 feet, the latter 16 feet by 16 feet, situated on lots 3 and 4, Mill street North. In a bad state of repair. Erected 1870.

6. *Wardsville*.—A wooden one company shed 80 feet by 48 feet, with an armoury 48 feet by 8 feet; erected on lot 9, south side of Main street, in 1867. In very bad state of repair.

COUNTY OF ELGIN, ONT.

DRILL SHEDS.

1. *St. Thomas*.—Size 112 feet by 60 feet, with armouries at either end 60 feet by 14 feet; also cavalry armouries and stores.

The lot measures 280 feet on Anne street, 133 feet on Crocker street, and 220 on Elgin. In want of repair.

Built in 1868.

2. *Wallacetown*.—A shed 80 feet by 50 feet; is situated on the Agricultural grounds, a part of Lot 12, Concession 8. Building in good condition. Erected 1870.

3. *Aylmer*.—Shed 80 feet by 42 feet, with an armoury 16 feet by 10 feet attached situated on Lot No. 13, Concession 7, Township of Malahide. Building in fair condition.

Built in 1877.

4. *Vienna*.—Shed 80 feet by 40 feet, in good state of repair, situated on Lot 16 corner of Elm and Ann streets, good state of preservation. Erected 1868.

ST. THOMAS.

POST OFFICE, CUSTOM HOUSE, ETC.

The site of the C.W. Presbyterian Church, on Lots 4 and 5, Talbot street, has been purchased by the Dominion Government, and plans are in course of preparation for building thereon to be occupied by the local Postal, Customs and Inland Revenue services.

COUNTY OF LAMBTON, ONT.

DRILL SHEDS.

1. *Widder*.—A wooden shed 83 feet by 49 feet with an armoury 50 feet by 4 feet, situated on lot 19, Lewis street.

Erected in 1868 and now in fair condition.

2. *Forest*.—Shed 84 feet by 45 feet with an armoury 10 feet by 9 feet, erected on a site on the Government property, 210 feet by 66 feet in 1873. Shed in a good state of preservation.

3. *Watford*.—A wooden shed 80 feet by 47 feet, armoury (at west end) erected on a lot on St. Clair street in 1868, now in good repair.

4. *Warwick*.—Shed 80 feet by 40 feet with armoury 40 feet by 4 feet situated on lot 13 South Egremont street, which measures 85 feet by 45 feet.

Erected in 1868 and now in fair condition.

COUNTY OF KENT, ONT.

CHATHAM.

DRILL SHEDS.

1. *Chatham*.—This building is 112 feet by 60 feet, situated on north side of Colborne street south of the Park. Erected in 1868.

2. *Tilbury East*.—A wooden building 80 feet by 46 feet, with an armoury and clothing room 12 feet by 8 feet, now in a fair state of repair, erected on part of lot No. 10 M. Road south, in the year 1870.

3. *Bothwell*.—Size 80 feet by 47 feet, of wood, and in a bad state of repair. It was erected on a lot on the corner of Main and Walnut streets, in the year 1868.

4. *Dresden*.—A wooden shed 80 feet by 40 feet, with an armoury 10 feet by 16 feet attached, both much decayed; erected on a lot No. 41 west side of Cross street measuring 66 feet by 132 feet.

INFANTRY BARRACKS.

This barracks is situated on the Military Reserve and was transferred to the Provincial Government of Canada by the Imperial authorities in 1856.

1. *Barrack Building*.—A two storey wooden structure 288 feet by 48 feet 8 inches, built to accommodate 400 men. On the ground floor are eight barrack rooms, a school room, a sergeants' mess, a kitchen, an orderly room and a regimental store; on the upper floor are twenty barrack rooms.

2. *Magazine*.—32 feet by 30 feet, with brick walls and sheet metal roof covering. There were also a number of detached outbuildings.

With the exception of the magazine, the buildings were removed in 1879, being in a dilapidated condition.

WINDSOR.

POST OFFICE, CUSTOM HOUSE, ETC.

This Department purchased a site fronting on Oulette, Pitt and Chatham streets and in 1878-79 entered into a contract for constructing the necessary buildings which was completed in 1879-80.

Accommodation is provided for the Post Office, Customs and Inland Revenue.

The facade on Oulette and Pitt streets have walls of stone coursed ashlar with tooled and moulded dressings, the remaining external walls being brick. Internal walls are partly brick and partly wood, roof of wood covered with slates on slope and galvanized iron on deck.

The main building consists of basement, ground, first and attic floors.

The basement contains a boiler room, a fuel room and store rooms; on the ground floor is the Post Office and Customs Examining Warehouse, and on the first floor Customs and Inland Revenue Offices. The caretaker occupies the attic.

Brick safes are provided for the various Departments.

A detached building in yard is occupied by the Inland Revenue Department.

The building is warmed by steam, and supplied with gas and water from the city services. Superintending Architect, Mr. Wm. Scott.

PROVINCE OF MANITOBA.

WINN1PEG.

FORT OSBORNE HUT BARRACKS.

Built in 1872 and consists of wooden buildings, which, with the exception of No. 24, are all one-storey.

1 to 10. Each 79 feet by 26 feet, accommodating 30 men. Nos. 1 to 5 of these are occupied by the Department of Agriculture for immigration purposes; No. 6 is used as an armoury; Nos. 7 and 8 are clothing stores; No. 9 is a recreation room; No. 10 a staff-officers' quarters.

11 and 12. The former a storekeeper's residence, and the latter a captain's residence; are each 40 feet by 25 feet.

13 to 17. *Cook-houses*.—Each 26 feet by 19 feet.

18. *Hospital*.—49 feet 6 inches by 27 feet 6 inches.

19. *Guard-room*.—Used as a powder store.

20. *Bake-house*.—27 feet by 19 feet; used for storing shot and shell.

21. *Ice-house*.—21 feet by 17 feet 6 inches.

22. *Shed*.—30 feet by 18 feet.

23. *Latrines*.—17 feet by 14 feet.

24. *Canteen*.—A two storey building, 45 feet 4 inches, by 20 feet 4 inches.

25. *Stable*.—Accommodation for sixteen horses.

26. *Cattle Shed*.—42 feet by 12 feet.

27. *Old Magazine*.—Abandoned.

28. *Old Root House*.—Caved in.

29. *Ice House*.—30 feet 8 inches by 17 feet 6 inches.

POST OFFICE.

This building was placed under contract in 1873-74, and completed and occupied in 1875-76. It is a two storey brick building on the corner of Main and Owen streets, having a stone foundation and wooden roof.

It consists of a main building 50 feet by 40 feet, with a projection for staircase and vaulted safe 25 feet by 10 feet.

The front is divided by piers into three bays, which are horizontally divided by string courses of ornamental brick work.

There is an ornamental clock pediment on roof over central entrance.

The local Post Office occupies the entire ground floor and Inspector's Office Savings Bank and Assistant Receiver General's Office the first floor.

Owing to the rapid increase of postal business, it was found necessary during the past year to make a one storey addition of wood in the rear to allow of the extension of the public lobby. The screen in lobby has been fitted with lock letter boxes, and such additional fittings provided as were required for the easier working of the office.

Building heated by stoves. Plans, &c., prepared by this Department. Resident Architect, Mr. J. P. M. Lecourt.

CUSTOM HOUSE.

Was constructed during 1873-74, on Block 3, Main street, having a frontage of 54 feet, with a depth of 56 feet, and adjoining the Dominion Lands Office. The building is of brick on a stone foundation with roof of wood, and has ground, first and attic floors; the ground floor contains the Custom House and Inland Revenue Offices, and the remaining portion of the building is the residence of the Collector of Customs.

Building heated by stoves; plans and specifications prepared by this Department. Resident Architect, Mr. J. P. M. Lecourt.

LANDS OFFICE.

Construction was commenced in 1873, and the building completed and occupied during 1875-76.

It is situated on Block 3, Main street, 74 feet from Custom House which it adjoins, and has a frontage of 41 feet. The walls are brick on a stone foundation, there being ground and first floors and an unfinished attic.

The building is occupied by the Dominion Lands Office for the Province.

Warming is by stoves; plans and specifications prepared by this Department. Resident Architect, Mr. J. P. M. Lecourt.

FORT GARRY IMMIGRANT SHED.

This is a wooden building, 21 feet by 180 feet, one storey in height, is situated on the property of the Hudson's Bay Company.

It is divided into thirty compartments, and is at present occupied by the Jews.

IMMIGRANT HOSPITAL.

This building was built during 1880-81 at Douglas Common, on the line of the Canada Pacific Railway.

It is a wooden two story building, 130 feet by 29 feet, with a wing in the rear.

This building has been recently sold.

PARLIAMENT HOUSE.

This building, which is now in progress, is situated between Broadway and Lewis street, bounded on the south by the Assiniboine River, covering a superficial area of 6,524 square feet. There will be a basement with stone walls, containing a boiler house, a fuel room and seven offices. The walls of superstructure will be brick with quoins and dressing of stone. On the ground floor will be a Legislative Chamber, 40 feet square on plan, and seven offices, brick safe, etc.; the first and attic floor will contain each nine offices.

Floors and roofs are to be wood covered with shingles on slopes and galvanized iron on flats.

Plans, etc., prepared by this Department.

Superintending architect, Mr. J. P. M. Lecourt.

LIEUTENANT-GOVERNOR'S RESIDENCE.

This building is now in course of erection on the Government reserve and will have stone foundations, brick walls and wooden floors and roof.

There will be a basement, two full storeys and an attic; the basement to contain a kitchen, a scullery, a still room, a cellar, a pantry, a larder, and a furnace and a fuel room; the ground floor, a drawing room, a dining room, a breakfast room, and a library, all communicating by folding doors and forming a suite of rooms, 96 feet by 20 feet; also a serving room, and His Honour's business offices; the remaining storeys contain bed rooms.

Drawings and specifications prepared by this Department.
Resident Architect, Mr. J. P. M. Lecourt.

STONY MOUNTAIN.

MANITOBA PENITENTIARY.

This building is situated on Stony Mountain, distant 14 miles from the City of Winnipeg.

Works were commenced in 1873-74, and carried on to completion and occupation in 1876-77.

The part of the building erected consists of the administration portion and one wing of prison, the former being two storeys with attic and basement, and contains living rooms and offices, and covers an area of 4,377 square feet; the prison covers an area of 3,010 square feet, and consists of a basement with 12 female cells, wash and bath rooms, water closets, boiler and fuel rooms, dining hall and kitchen, and a ground floor with three tiers of cells, having twenty each on first and second tiers and fifteen on third tier; the cells are placed in a double row in the centre of the wing facing outwards, with corridors 10 feet wide between them and outside walls, the upper tiers being approached by stairways and open galleries.

Building heated by steam.

Outbuildings have been erected with convict labour from time to time as follows, viz.:—Three double and two single guards' dwellings, a school room, an ice house a horse stable and a piggery.

There are now in course of construction in the same manner cow stable, root house, smithy and carriage and implement house.

Plans, etc., prepared by this Department.

Resident Architect, Mr. J. P. M. Lecourt.

NORTH-WEST TERRITORIES.

BATTLEFORD.

LIEUT.-GOVERNOR'S RESIDENCE.

The residence of the Lieut.-Governor was completed and ready for occupation in 1878.

The walls were constructed of hewn logs resting on a stone foundation, the chinks being filled with mortar; inside the walls are strapped, lathed and plastered, and clapboarded outside; the roof is shingled; there is a cellar under a part of the building.

On the principal floor the accommodation consists of, (1) a reception room, 50 feet by 30 feet; (2) a dining room, 24 feet by 16 feet; (3) a drawing room, 24 feet by 16 feet, (4) a parlour, 15 feet by 16 feet, 2, 3 and 4 being arranged *en suite* with folding doors between, also (5) an office, (6) entrance hall, (7) hat and cloak room, (8) kitchen and pantry.

On the first floor are eight bedrooms.

This building is warmed by stoves.

The following buildings were erected and ready for occupation in 1878:

STIPENDIARY MAGISTRATE'S RESIDENCE.

Is a two storey wooden building, having a dining room, a parlor, an office and a kitchen on the ground floor; and on the first floor six bed rooms. This building and the two following have stone foundations:

REGISTRAR'S RESIDENCE.

A two storey wooden building, containing a parlour, a dining room, a kitchen and four bed rooms.

CLERK OF THE COUNCIL'S RESIDENCE.

Is similar in construction to Lieutenant-Governor's residence, and contains a parlour, a dining room, a kitchen and three bed rooms.

COMMANDANT'S QUARTERS.

Consist of a parlour, a dining room, a kitchen, three bed rooms and a cellar.

REGISTRY OFFICE.

Walls are of brick, on a stone foundation; the building is 43 feet by 24 feet, divided into three rooms—the two in front, for the storage of deeds, being vaulted and fire-proofed. The remaining room is an office; doors throughout of iron, and windows protected by iron guard bars and iron shutters.

In addition to the above are the following police buildings:

Barracks.

Officers quarters.

Quarters for married men.

“ “ “ “

Quarter-Master's stores.

Workshops.

Hospital.

Stables to accommodate 160 horses.

The office, official residence and barracks, &c., were erected from plans prepared by this Department.

PROVINCE OF BRITISH COLUMBIA.

VICTORIA.

POST OFFICE, SAVINGS BANK, PUBLIC WORKS AND INDIAN DEPARTMENT OFFICES.

Building was erected in 1873-74 and is two storeys in height with walls of stone and floors and roof of wood, the last mentioned being covered with tar and gravel.

Owing to the disintegration of the stone in the street front wall a new front had to be constructed in 1879-80, and a re-arrangement of offices was made during the same year and that following. Architect, Hon. B. W. Pearse.

CUSTOM HOUSE, INLAND REVENUE AND MARINE OFFICES.

Construction was contracted for in 1873-74 and the works were completed in 1875-76.

It is a brick building on a stone foundation, floors and roof of wood, the frontage is 40 feet and the depth 62 feet.

In the basement are the caretaker's quarters, fuel room and examining warehouse, the ground floor has accommodation for Customs Department, viz., long room, Collector's office, landing waiters and clerks, offices, etc. On first floor are the Inland Revenue and Marine Offices. Brick safes are provided for the various Departments.

Plans prepared by this Department. Superintending Architect, Mr. H. O. Tiedmann.

MARINE HOSPITAL.

This is a stone building having an upper and a lower ward capable of accommodating forty patients, also the necessary offices, including physicians, residence, kitchens, wood house, dissecting room, bath rooms, etc. Works commenced in 1872-73, and completed in 1874-5.

DRILL SHED.

The main building is 110 feet by 35 feet, with lean-to offices, armouries and store, 15 feet wide, situated on south-west side of Menzies street, and requires to be repaired.

NEW WESTMINSTER.

BRITISH COLUMBIA PENITENTIARY.

The site chosen was on Government Reserve, New Westminster, on the right bank of the River Fraser, comprising 77 acres. Construction was commenced in 1874-75, and the building was completed and handed over to the Department of Justice in 1877-78.

The part of the building erected is of stone with brick backing to outer walls and brick partitions and arches to cells. The roof is of wood, the front portion covering an area of 4,737 square feet, containing two storeys, with attic and basement, is used as living rooms and offices; the remaining, covering an area of 3,010 square feet, is the prison, and consists of a basement which contains the heating apparatus, female cells, etc., and an upper storey with three tiers of cells for males, making a total of 67 cells (8 feet by 4 feet) in the entire prison; the cells are placed in the centre of the wing with a 10-foot corridor on each side, the second and third tiers having iron galleries with iron stairs.

The main entrance is in the centre of the ground floor, front opening into a corridor 8 feet wide, which divides this story into equal divisions and communicates with the prison.

Ventilation is provided for by a brick vent shaft enclosing the furnace smoke stack.

Plans, etc., prepared by this Department.

Superintending Architect, Hon. B. W. Pearse.

POST OFFICE AND CUSTOM HOUSE.

Contract was entered into and works commenced in Dec., 1881, which are still in progress. The wall of building is to be brick with a stone foundation with stone dressing to external openings on principal front and will comprise ground, first and attic floors, roofing and floors of wood; on ground floor there will be provision for Post Office, a Savings Bank and a Telegraph Office; on the second floor will be the Custom House.

Plans and specifications prepared by this Department.

DRILL SHED.

A wooden building 66 feet by 40 feet with a lean to armoury 24 feet by 12 feet, situated on Mackenzie street Lot 10, Block 13, and requires slight repairs.

APPENDIX No. 3.

REPORT ON THE HARBOURS, RIVERS, ETC.,
THROUGHOUT THE DOMINION,

From 1867 to 1882.

BY

H. F. PERLEY, CHIEF ENGINEER.

APPENDIX No. 3.

REPORT ON HARBOURS AND PIERS THROUGHOUT THE DOMINION,
FROM 1867, TO 1882.

(No. 6,374 subj. Reports.)

CHIEF ENGINEER'S OFFICE,
OTTAWA, 1st March, 1883.

SIR,—I have the honor to submit herewith statements having reference to the construction, improvement and maintenance of Harbors and Piers, etc., in the Dominion since 1st July, 1867, and up to 30th June, 1882.

I have the honor to be, Sir,
Your obedient servant,

HENRY F. PERLEY.

F. H. ENNIS, Esq., Secretary,
Public Works Department.

PROVINCE OF NOVA SCOTIA.

JOGGINS.

This harbour is situated in Cumberland County, near the head and on the south-eastern side of the Chignecto Channel, and is the shipping place for the coal from the Joggins mines.

In 1874 the sum of \$10,000 was expended by the Department in adding 100 feet to the length of the pier already standing on the western side of the harbour, in flooring and repairing the old part of the structure, in building a breakwater 170 feet in length on the eastern side and in the removal of a ledge of rock and an accumulation of gravel from the basin thus formed.

The results of this work have been satisfactory as the gravel which formerly lodged inside the old pier and shoaled the harbour is now arrested by the eastern breakwater.

Spring tides rise 41 feet and neaps $34\frac{1}{2}$ feet.

PORT GREVILLE.

Port Greville, Cumberland County, is situated on the northern side of the Basin of Minas, at the mouth of Ratchford river. It is about ten miles west of Parrsborough, and fifteen miles east of Cape D'Or. The harbour is formed by a high gravel bar which lies parallel to the shore, and on the inner side of which the river runs for more than half a mile. This bar was always covered by high water at the time of spring tides, and in the fall of 1882, a gale occurring during high tide the sea swept off the summit for a length of 2,800 feet, and a depth of two and a half feet. The protection thus afforded by the beach was in a great measure destroyed, and to restore and improve it, a wall of cribwork 2,200 feet long with an average height of several feet, was built in 1874, at a cost of \$6,028.

PARRSBOROUGH.

Parrsborough, Cumberland County, situated on the north side of the Basin of Minas, near the mouth of Partridge Island River, is the terminus of the Spring Hill and Parrsborough Railway and the principal point of communication between Cumberland County and the Counties of Hants and Kings, on the south side of the Basin. In 1864-65 a pier was built by the Provincial Government, and in 1878 and the three following years the Department expended \$1,414.94 in repairing the damage done by ice, etc.

PARTRIDGE ISLAND OR PARRSBOROUGH RIVER.

During 1879-80 and 1881-82 the channel of the river, between its mouth and the village, has been improved by dredging at a cost of \$4,500.

MAITLAND.

The village of Maitland is situated on the south shore of Cobequid Bay, at the mouth of the Shubenacadie River, the northern outlet of a canal which was projected many years ago with the object of connecting Halifax Harbour and the Bay of Fundy, and partially executed, but subsequently abandoned. Maitland is the centre of a large district, in which, in former years, shipbuilding was largely carried on, and is still prosecuted to some extent. The steamers plying on the Basin of Minas make this a port of call. A landing pier was begun by the Department in 1873 and completed in 1876, at a total cost of \$6,341.99.

Tides rise from $43\frac{1}{2}$ to 50 feet.

CHEVERIE.

Cheverie, Hants Co., is a village on the south shore of the Basin of Minas, near the mouth of the River Avon, and about sixteen miles from Windsor, the Shiretown.

The principal trade of the place consists in the shipment of gypsum to the United States. The quantity, which varies according to the prices in the American market, ranges from 20,000 to 60,000 tons per annum.

A pier was built here by the Provincial Government, and, in 1873-74, the Department expended \$2,338.88 in extending it 70 feet.

Spring tides rise 48 feet, and neaps 40 feet.

WINDSOR.

Windsor is the shire town of Hants County. It is situated on the eastern bank of the river Avon, and is one of the principal stations on the Windsor and Annapolis Railway. It is the centre of a fertile district and a place of considerable trade.

During the summers of 1879-81 \$1,627.60 were spent in deepening the water along the face of the railway wharf. The work was done by hand during low water.

AVONPORT.

Avonport, King's County, is at the mouth of the River Avon, and is a station on the Windsor and Annapolis Railway, distant 12 miles from Windsor. In 1878 \$500 were expended in repairing the landing pier.

CANNING.

The pier known as "Pickett's Wharf" is situated about two miles below the village of Canning, Kings Co., near the mouth of the Habitant River which falls into the western side of the Basin of Minas. The work was commenced in 1845 and extended in 1859-60 by the inhabitants assisted by the Provincial Government. In 1878 the Department expended \$500.00 in raising and repairing the structure.

OAK POINT.

Oak Point, now called Kingsport, Kings' County, is situated on the western shore of the Basin of Minas, between the mouth of the Cornwallis River and Cape Blomidon.

A pier 445 feet in length, built of piles, already stood here when the harbour was taken in charge by the Department, but before any work was commenced all the rights of the Pier Company were transferred to the Crown.

In 1873-74, the sum of \$4,003 was expended in building cribwork 12 feet wide on the eastern or exposed side, for the purpose of breaking the force of the sea.

In March, 1875, a contract was made for the extension of the pier 270 feet with a width of 30 feet, in order to increase the area sheltered and afford earlier access to the harbour, which owing to the great range of tides (from 40 to 48 feet) is dry between half-ebb and half-flood. This work was completed in November, 1875.

The total expenditure has been \$24,577.20.

SCOTT'S BAY.

Scott's Bay, Kings County, is situated in the Minas Channel, Bay of Fundy, not far from Cape Split. In 1879 a breakwater 350 feet in length was built on the western side of Jess Creek to form a harbour and shelter for vessels during southerly westerly storms. The amount expended was \$3,000.00.

CHIPMAN'S BROOK.

Chipman's Brook, Kings County, is situated on the southern shore of the Bay of Fundy, sixty-four miles east of Digby Gut. In 1877, a length of 60 feet was added to the breakwater built by the Provincial Government. The amount expended was \$2,750.

CANADA CREEK.

Canada Creek, Kings Co., on the south shore of the Bay of Fundy, sixty miles east of Digby Gut, is a small harbour formed by two piers: the western built by the residents of the locality and the Provincial Government, and repaired by the Department in 1874 at a cost of \$2,499.94, and the eastern 150 feet in length, built in 1878 by the Department with an expenditure of \$3,000.00.

HARBORVILLE.

Harborville, Kings County, is on the south shore of the Bay of Fundy, about fifty-five miles east of Digby Gut. In 1876 the breakwater, built some years before by the Provincial Government, was extended by the Department at a cost of \$2,000.

VICTORIA HARBOUR.

Victoria Harbour, King's County, is situated at the mouth of Church Vault Brook on the southern shore of the Bay of Fundy about ten miles east of Margaretville. The pier is 240 feet long and 25 feet wide, with an approach 328 feet long faced with crib-work. It was begun in 1864 and finished in 1867, having been built by the inhabitants, assisted by the Provincial Government. In 1878 the sum of \$1,000 was expended by the Department in repairing the work and raising it a height of 4 feet.

MORDEN.

Morden, or French Cross, King's County, is situated on the southern shore of the Bay of Fundy, about fifty miles east of Digby Gut. In 1874 \$3,000 were expended in refacing the portion of the western breakwater built in 1849, by the Provincial Government, in the construction of a spur sixty feet in length to arrest and retain the

shingle, in sheathing the work where required, in building a bulkhead and in excavating the slip. In 1878 and '79, the pier was widened and a block twenty feet in length, built for the purpose of securing the outer end, which had become much decayed. The cost of these works was \$2,500.06, making a total of \$5,500.06.

MARGARETVILLE.

Margaretville is on the south shore of the Bay of Fundy, in Annapolis County, and about forty-two miles east of Digby Gut. A pier was begun here in 1837 by the Provincial Government, and subsequently extended to a length of 471 feet. When taken in charge by the Department in 1871 it was found to be much damaged by sea-worms and in need of extensive repairs, which were made in the two following years at a cost of \$3,650.

In 1876 a further amount of \$5,000 was expended in extending the pier, and in 1879 \$500 in repairs, making a total of \$9,150.

This is one of the two places selected as eligible for the formation of a harbour of refuge, Harborville, thirteen miles to the eastward, being the other.

PORT GEORGE.

Port George, Annapolis County, is thirty-seven miles east of Digby Gut, on the south shore of the Bay of Fundy. A breakwater 440 feet long was built by the Provincial Government prior to 1867, and subsequently another pier to the eastward of the first. In 1874 the harbour was taken in charge by the Department, and in that and the following year \$7,000 were expended in repairing and refacing the western pier, which on examination was found to be much decayed and worm eaten.

PORT LORNE.

Port Lorne, formerly Port Williams or Marshall's Cove, is thirty miles east of Digby Gut and in the County of Annapolis. In 1873-74 the sum of \$3,500 was expended in adding 67 feet to the length of the pier, built at the joint expense of the inhabitants and the Nova Scotian Government. This work was begun in 1835 and up to 1867 it is said to have cost about \$16,000. In 1879 some necessary repairs were made at a cost of \$745.76, making a total expenditure by the Department of \$4,245.76.

HAMPTON.

Hampton or Chutes Cove, Annapolis County, is twenty-five miles east of Digby Gut. A small pier 165 feet in length was built near the western side of the Cove some years ago by the Provincial Government. The site was chosen by Commissioners, apparently without professional advice, and was objectionable on many accounts. In 1879 an addition of 121 feet was made by the Department and the older parts strengthened, with the hope of remedying some of the defects of location. The cost of this was \$3,000. In 1881 on further examination it was found that the original work had been badly undermined by the sea, and that owing to the direction of the pier the shingle was fast shoaling the water on the inside. It was therefore decided to remove the structure to another site about half a mile eastward, which has accordingly been done.

The new pier is 246 feet long, and is better built and much better located than the old one. Its cost when completed will be \$2,300, such of the materials of the former pier as were sound and fit for the purpose having been used in its construction. Total expenditure by the Department, \$4,752.37.

DELAP'S COVE.

Delap's Cove, Annapolis County, is situated on the south coast of the Bay of Fundy, about 12 miles east of Digby Gut. In 1879, the sum of \$2,150 was expended

in the construction of a breakwater 150 feet in length and a retaining wall of crib-work in line with the western side of the pier.

ANNAPOLIS HARBOUR AND RIVER.

The town of Annapolis Royal was first settled by DeMonts, in 1604, and afterwards became the capital of the Province of Acadia. It is situated on the southern bank of the Annapolis River, seven miles above its mouth at Goat Island. It is the Western terminus of the Windsor and Annapolis Railway, and the point of connection with steamers running tri-weekly to St. John, N.B., and weekly to Boston, Mass. A company has recently been formed for the purpose of establishing a line of steamers direct to England. As the chief port of shipment for the products of the fertile Annapolis Valley it is a place of considerable trade. It is accessible at all times of tide, the harbour and the river below the town having a depth at low water of from four to six fathoms. The tides rise from 23 to 28 feet. The Department has expended \$750 in removing a reef near the Railway Wharf.

Above the town the river is navigable at high water as far as Bridgetown, a distance of 19 miles. A number of large boulders which formerly obstructed the channel have been removed at a cost of \$1,333.77.

DIGBY.

The town of Digby is situated at the western end of Annapolis Basin. It is the present terminus of the Western Counties Railway, and a port of call for the steamers running between Annapolis and St. John, N. B., and Boston. The harbour is open at all seasons. The pier, which stands at the northern end of the town, is 866 feet long, 37 feet wide for 560 feet and 45 feet wide for the remainder of its length. It is the only wharf in the place accessible at low water, the depth at the end being 10 feet with ordinary tides.

Winds from between north and north north-east throw a heavy sea through the Gut directly on to the pier, and if there is at such times much drift ice in the Basin the structure is liable to severe damage.

The first pier was built by the Government of Nova Scotia some years before Confederation, and was nearly destroyed by the gales which prevailed in the Bay of Fundy in 1866 and 67. In 1869 Parliament granted \$2,920 to assist in rebuilding. This amount was transferred to the Provincial Government and expended by them. The pier as then built was of pile bents 12 feet apart for 560 feet of the length. The next was a block of crib work 80 feet by 45 feet, the southern half of which was sloped to form the inclined plane rendered necessary by the great rise and fall of tide (from 23 to 27 feet). This incline was finished by a block 170 feet long by 22 feet wide, and the northern half of this portion was of pile bents 8 feet apart. The outer end of the pier consisted of a block 56 feet by 45 feet and about 40 feet high. The whole of the northern face was close piled.

In 1872 the sum of \$1,650 was expended by the Department in completing and repairing the pier. In 1874 a number of piles and braces were renewed, the outer block newly fendered and new joists and planking laid for the whole length, at a cost of \$2,500.00. During a gale on 22nd February, 1879, a schooner, loaded with produce for the West Indies parted her cable and was swept bodily through the pier, carrying away a length of 130 feet. The cost of repairing this damage was \$2,367.73.

Sea worms (the *limnoria terebrans*) abound in these waters, and the piles and other timbers are much weakened by them, the former in many cases being entirely cut off. These require to be replaced from time and \$888.57 was expended in 1881-82 in work of this nature, making the total expenditure up to 30th June, 1882 \$10,326.30.

The principal exports of the town are cattle, sheep, fish and fruit.

TROUT COVE.

Trout Cove is situated on the Bay of Fundy coast of Digby neck, nearly midway between Digby Gut and Petit Passage. In 1858 the inhabitants, assisted by a grant from the Provincial Government, built a breakwater 200 feet long and 30 feet wide. In 1876 a block 175 feet long and 30 feet wide was added by the Department, and in 1880 and again in 1881 extensive repairs were made to the old part of the breakwater, 100 feet of which had been completely destroyed by a storm in 1879. The total expenditure by the Department has amounted to \$5,499.76.

PLYMPTON.

Plympton is situated on the south shore of St. Mary's Bay in Digby County. In 1874 and 1875 the sum of \$3,543.97 was expended in the construction of a block 34 feet square at the outer end of the pier, built some years before Confederation by the Provincial Government, and in general repairs to that structure.

SISSIBOO RIVER.

The Sissiboo River flows into St. Mary's Bay. In 1875 the sum of \$2,500.00 was spent in removing two rocky shoals which interfered with the navigation. The town of Weymouth stands on its eastern bank and is a place of considerable trade.

BELLEVEAU COVE,

Belleveau, Digby County, is on the south-east shore of St. Mary's Bay, and about 4 miles from Weymouth. The harbour is formed by two breakwaters; the eastern, built in 1825, and the western in 1853, at the joint expense of the Provincial Government and the inhabitants. In 1878, the Department expended \$3,000 in putting those structures into thorough repair, and in the construction of an additional length to the eastern pier.

CHURCH POINT.

Church Point is situated on the southern shore of St. Mary's Bay, Digby County. The breakwater was built about 36 years ago, at the joint expense of the Provincial Government and the local authorities. In 1876 the sum of \$2,000 was expended by the Department in repairing the work, an equal amount having been furnished by the residents of the locality.

SAULNIERSVILLE.

Saulniersville, Digby County, is about three miles east of Meteghan River, on the south shore of St. Mary's Bay. In 1876 the sum of \$2,000 was expended, together with a similar amount provided by the locality in repairing the breakwater and adding 100 feet to its length.

METEGHAN RIVER.

Meteghan River falls into St. Mary's Bay about two miles north east of Meteghan Cove. The works consist of two breakwaters at the mouth of the stream, the southern nine hundred feet long and the northern four hundred and eighty feet long, which were built by the Provincial Government. When the works came under the charge of the Department the older parts were much decayed, and extensive repairs needed which were made in 1873 by an expenditure of \$4,500. In 1881 \$2,000 were expended in rebuilding and repairing parts of both breakwaters, making a total of \$6,500.

METEGHAN COVE.

Meteghan Cove, Digby County, is on the south shore of St. Mary's Bay, about twenty-five miles from Yarmouth, and forty from Digby. A pier was built at this place about forty-five years ago by the Government of Nova Scotia, and in 1875 this was extended and repaired by the Department at a cost of \$1,000.

In 1878 an additional length of one hundred feet was built, together with a portion of the spur at the outer end. The cost of this was \$3,000. In 1881 the structure was improved by the addition of fifty feet to the spur, the cost being \$2,250. The Cove is now capable of affording shelter to a considerable number of coasting vessels. Total expenditure by the Department, \$15,202.79.

CAPE ST. MARY.

Cape St. Mary, Digby Co., is the southern point of the entrance to St. Mary's Bay. It is one of the best fishing stations on the coast; cod, haddock, pollock and herrings being caught in abundance.

A breakwater now 310 feet long, was begun about thirty-six years ago, and has been built in sections by the inhabitants, assisted from time to time by small grants from the Provincial Government, amounting in all to about \$1,200. From age and the action of the sea and ice, the work had become much dilapidated. It was partially rebuilt in 1881-82 by the Department at a cost of \$2,000, and further repairs are now in progress, a grant of \$2,500 having been made by Parliament for the purpose.

SALMON RIVER.

In 1874 the Department expended \$2,656.03 in repairing and strengthening the breakwater at Salmon River, $2\frac{1}{2}$ miles south of Cape St. Mary, Digby County. This structure was built some years before Confederation by the Government of Nova Scotia.

GREEN COVE.

Green Cove, Yarmouth County, is situated about thirteen miles north of the town of Yarmouth. The appropriation for this place was made upon condition that the portion of the works belonging to the "Pond Company" should be transferred to the Crown. This having been done, the amount of \$4,500 was expended in extending the eastern breakwater a distance of 50 feet, in raising and widening the inner end for a length of 158 feet, and in constructing a spur 75 feet long on the Western Breakwater.

CRANBERRY HEAD.

Cranberry Head is about six miles north of Yarmouth. At this place a breakwater was built some years ago by the local authorities. In 1876, the sum of \$2,000.00 was expended by the Department in extending the work 150 feet, and, in 1878-79, a further sum of \$1,000.08 in construction of an additional length of 50 feet, and in repairing the older portions. In 1880, the sum of \$499.95 was employed in repairing the damage done by a storm in August, 1879, making a total expenditure by the Department of \$3,500.03.

YARMOUTH.

The town of Yarmouth is situated at the western extremity of the peninsula of Nova Scotia. The harbour is formed by shingle beaches, which extend from the northern end of Cape Fourchu Island to the main shore, and separate it from the Bay of Fundy. In 1867 it was found that the part of the beach between Cape Fourchu and Stony Point was gradually wearing away, and that if this action was not arrested the sea would eventually sweep away the beach and destroy the harbour.

The Government of Nova Scotia began the work of protection by the construction of 200 feet of cribwork at Stony Point. During 1873 and '74 the Department completed the remaining length of 2,800 feet, to Cape Fourchu, at a cost of \$12,103.25, and in 1875 \$1,000 were expended in building buttresses to stop the movement of the shingle. Since then small sums amounting in all to \$2,514.54 have been expended from time to time in repairs and maintenance. The work is a very necessary one, and until the beach forms outside, which action is gradually taking place, it will be exposed to a heavy sea which undermines it and renders constant watching necessary. Total expenditure by the Department for protection of works, \$15,617.79.

During 1876, 1877 and 1879 the sum of \$13,687.25 was employed in deepening the harbour opposite the town by dredging.

TUSKET.

In 1876 \$500, and in 1879 \$500.64 were expended in blasting and removing a number of boulders from "the Sluice" a narrow channel, much used by fishing vessels, between Great Tusket Island, Yarmouth County and the mainland.

JORDAN BAY.

Jordan Bay, Shelburne County, is on the south-east coast of Nova Scotia and lies open to the Atlantic.

There is no natural shelter from southerly winds for vessels resorting to this place to load with lumber, which is cut in considerable quantities on the Jordan River which falls into the head of the bay.

In 1875 a breakwater 550 long was built on the eastern shore about six miles from the mouth of the bay. In 1878 a quantity of heavy stone was deposited on the seaward side and end to protect the foundation from the scouring action of the waves and tidal currents. In the spring of 1879 the outer end for a length of 100 feet was carried away down to within 2 feet of low water mark, and works are now in progress for repairing this damage. The total expenditure up to the 30th of June last was \$24,746.12.

LOCKEPORT.

Lockeport, Shelburne Co., is a small but well sheltered harbour on the north side of Locke's Island about 12 miles east of Shelburne Harbour. In 1874 and in 1878 \$6,334.85 were expended in deepening the channel in front of the wharves by dredging.

LITTLE HOPE ISLAND.

Little Hope Island lies on the south-east coast Nova Scotia, about two miles from the mainland, and nearly midway between Port Mouton and Port Joli, Queen's Co. It is about 280 feet long by 180 feet wide at high water, and about 650 feet by 300 feet at low-water, and is exposed to the full sweep of Atlantic storms. The original surface soil, which is composed of three feet of peat mixed with small boulders overlying hard yellow clay and gravel, had been wasting away rapidly of late years, and in 1869 was reduced to an area of about one-fourth of an acre, standing at the north end eight feet and at the south end twelve feet above high water.

There is a light-house on the island, which was threatened with destruction unless the encroachments of the sea were stopped.

In January, 1871, a contract was made for the construction of a sea wall 285 feet long, 20 feet wide and 16 feet high on the most exposed sides of the island. This was completed in September, 1872, its total cost being \$12,218.44.

Lying directly in the track of coasting vessels and on a coast where dense fogs are prevalent, this island is exceedingly dangerous and its preservation as a site for a light house is of the utmost importance.

SOMERVILLE.

Somerville is a small harbour thirteen miles south of Liverpool, Queen's County. A breakwater for the accommodation and shelter of fishing vessels, was constructed at this place in 1879 at a cost of \$4,990.25. During the past year have been spent in repairing the damage done by southerly storms.

WHITE POINT.

White Point, Queens County, is situated about six miles south-west of Liverpool. A small breakwater was constructed some years ago by the inhabitants and the Provincial Government. In 1878-79 the Department expended \$4,000 in building an addition to the breakwater, in strengthening and repairing the old part and in removing a number of large granite boulders from the area sheltered.

BROOKLYN.

Brooklyn, or Herring Cove, is situated on the east side of Liverpool Bay, and about half a mile outside the bar of Liverpool Harbour, Queen's County.

The bar at the mouth of Liverpool Harbour had, according to the chart of 1830, 9 feet over it at low water, but the chart of 1861 shows that it had by that time shoaled to $4\frac{1}{2}$ feet, probably from the accumulation of sawdust and other refuse from the mills on the river. In 1874, 8,800 cubic yards of sand and sawdust were removed from the bar by the dredge "Canada," and again, in 1877, 4,140 cubic yards were removed, increasing the depth to between 6 and 7 feet. The cost of dredging was \$4,762.38.

Liverpool Bay, lies open to the Atlantic, with a mouth two miles wide, and an extremely heavy sea is thrown into it by south-easterly winds. At such times vessels cannot anchor with safety in any part of it, and those which are of too great draught to cross the bar until high water, as well as those driven in by stress of weather, are obliged to seek refuge in Herring Cove. Between 300 and 400 vessels anchor there during the year. Before the construction of the breakwater they were exposed to a dangerous ground swell, and in order to improve the shelter the Provincial Government built a pier 300 feet long. This was not considered well situated, and when the works came under the charge of the Department the new breakwater was located at a point 800 feet more to the south. A length of 434 feet was completed in September, 1873, and an additional length of 300 feet in November, 1874. Besides being exposed to a heavy sea, the breakwater is much weakened by the attacks of sea worms, and it has for some time past been the intention to cover the cribwork with slopes of heavy stone. This was partially carried out in 1881 by the placing of about 10,000 cubic yards on the seaward side and end.

The cost of the works has been \$67,812.48.

Spring tides rise 8 feet and neaps 5 feet.

PUDDING PAN ISLAND.

The Pudding Pan is a small island lying about half a mile off the coast, nearly midway between Coffin's Island and Medway Head. At low water it is almost connected with the mainland by rocky reefs and bars. To complete this connection a detached breakwater, 875 feet in length, has been constructed on the shoals east of the island. This has the effect of sheltering the cove west of the island from south-easterly gales, and forms a small harbour of refuge, which, however, is still open to the Atlantic on the south-west.

The work was done in 1879 at a cost of \$5,714.75.

PORT MEDWAY.

Port Medway, Queen's County, is about ten miles east of Liverpool, and stands on the southern side of the bay of the same name, and about three miles from it.

mouth. The works at this place were built in 1875-76, and consist of beach protection to prevent the sea from breaking through into the harbor. The original cost was \$4,513.50. In 1880 it was found necessary to expend \$214.73 in refilling portions of the cribwork in which the ballast had settled, making a total expenditure by the Department of \$4,728.23.

VOGLER'S COVE.

Vogler's Cove is on the eastern side of Port Medway Bay. During the past year \$5,075.53 has been expended in deepening to 10 feet at low water, the channel leading to the harbour.

LITTLE HARBOUR.

Little Harbour, Lunenburg Co. In October, 1881 \$200 was expended in clearing and deepening the channel over the bar for a length of about 600 feet, a width of twenty feet, and to a depth at low water of three and a half feet, thus enabling the fishing boats to enter the harbour at all times of tide.

BROAD COVE.

Broad Cove, Lunenburg County, is on the south-east coast of Nova Scotia, twenty miles west of Cross Island, at the mouth of Lunenburg Bay. It is open to the Atlantic, between south-east and south. A breakwater, 400 feet long, was built, in 1876, near its head, in order to give shelter to fishing boats. The cost of the work was \$3,000.

LUNENBURG.

Lunenburg Harbour, at the head of Lunenburg Bay, is about 40 miles west of Sambro Light. It is secure and well sheltered and has a depth of from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms at low water. Its length inside a line drawn between Moreau and Battery Points is about a mile and its width about half a mile.

In 1876 and 1877 \$10,849.66 was expended in removing an accumulation of mud from the channel.

Lunenburg is, next to Halifax, the principal depot for the fisheries of this coast.

MAHONE BAY.

Mahone Bay, Lunenburg County, is on the southeast coast of Nova Scotia. In 1878-79, \$5,958.65 were expended in dredging the channel in front of the town of Chester, which stands on the western shore near the head of the Bay.

TANCOOK ISLAND.

Great Tancook Island, Lunenburg County, is situated in Mahone Bay, about eight miles south of the Town of Chester and ten miles north-east of Cross Island, at the mouth of Lunenburg Bay. The Island is two and a-half miles long by one and a-half miles greatest breadth, and is inhabited altogether by fishermen.

In 1873, the sum of \$2,000 was expended, together with a similar amount granted by the Legislature of Nova Scotia, in constructing a public landing and breakwater at West Cove. The pier extends in a south-westwardly direction from the shore, for a distance of 200 feet, having a spur at its outer end. For a length of 165 feet the structure is of cribwork, filled with stone, the remaining length and the spur being built of piles. At present it affords a very limited amount of shelter to boats and small vessels.

KETCH HARBOUR.

Ketch Harbour (probably a corruption of Catch or Kedge Harbour), Halifax County, is about three miles east of Cape Sambro, and about the same distance from Sambro Island Light. In 1878 the sum of \$985.50 was expended in dredging the inner bar.

HERRING COVE.

Herring Cove, Halifax County, on the western side of the entrance to Halifax Harbour, is a small boat harbour which in 1875 was improved by dredging. The cost of the work was \$8,015.05.

HALIFAX.

Between 1875 and 1880 the amount of \$3,758.66 was expended in dredging at the railway and other wharves in Halifax Harbour. When this was done for private companies the cost was refunded by them, the sum thus received amounting to \$1,075, leaving a balance of \$2,683.66 as the expenditure by the Department

PORTER'S LAKE.

Porter's Lake, Halifax County, is an extensive sheet of water eighteen miles east of Halifax. It is nearly seven miles long, with an average width of about half a mile and a depth of from ten to twenty feet over the greater part of its area. Its southern end is separated from the Atlantic by several Islands connected by beaches of sand and shingle, and from Three Fathom Harbour by a high, narrow, rocky ridge of land. A proposition was made some years ago to connect the Lake with that harbour by means of a canal and tidal lock, and several surveys and estimates for such a work have been made. The only outlet at present is a narrow and shallow stream running into the Atlantic through one of the beaches at the southwest corner of the lake. This is impassible even by boats and a small amount (\$200) was expended in 1881 in attempting, without much success, to improve it so far as to enable boats to enter at high water.

THREE FATHOM HARBOUR.

Three Fathom Harbour is in Halifax County, about fourteen miles east of the entrance of Halifax Harbour. It is formed by islands and their connecting beaches, and though small, is well sheltered from all quarters. In 1879, an outlay of \$2,999.94 was made in constructing protection works to prevent the opening of a breach in one of the beaches, already much reduced by the action of the sea, and which would, to a great extent, have destroyed the harbour.

CHEZZETCOOK.

Chezzetcook, Halifax Co.—In 1874-75, \$2,593.70 were expended in deepening the channel of Chezzetcook Inlet, about fifteen miles west of Halifax Harbour.

MUSQUODOBOIT.

Musquodoboit Inlet is on the south-east coast of Nova Scotia, about twenty-eight miles to the eastward of Halifax Harbour, and in the County of Halifax.

In 1877-78 the amount of \$1,831.10 was expended in the removal of boulders from the bar at its entrance.

SHERBROOKE.

The town of Sherbrooke, Guysborough County, stands on the eastern bank of the River St. Mary. About half a mile below the town, the channel of the river is obstructed by a bar of sand and gravel, the least depth over which is 4 feet at extreme low water. The removal of this bar to a depth of 8 feet at low water would permit small vessels to reach Sherbrooke at all times of tide and would give 13 or 14 feet at high water, a depth sufficient for a large class of vessels. During 1881-82 the sum of \$354.10 has been spent in partially dredging the required channel.

LARRY RIVER.

Larry River falls into the western end of Tor Bay, Guysborough County. In 1878 \$6,546.70 were expended in improving the channel by the removal of 26,230 cubic yards of mud and boulders.

CANSO HARBOR.

Canso Harbor, Guysborough Co., is a place of much historical as well as nautical interest. It was visited by French fishermen and fur traders as early as the 16th century. In 1578, the number of fishing vessels on the coast was 330, of which 150 were French, 130 Spaniards and Biscayans, and 50 English. During the next two hundred years it was the scene of frequent conflicts between the French and British colonists and the Indians, falling alternately under the power of France and England until 1759, when the contest was finally terminated. The remains of a large fort which commanded the approach from the Atlantic may still be seen on Grassy Island.

Canso lies at the southern entrance of Chedabucto Bay through which all vessels entering or leaving the Gulf of St. Lawrence by the Gut of Canso must pass, and near the point where the general trend of the coast of Nova Scotia changes from south to west.

It has two entrances—the northern leading from Chedabucto Bay and the southern from the Atlantic. There is also a narrow boat channel called the "Tickle" between Durell Island and the mainland. Many vessels pass through the harbour in order to avoid going round the dangerous rocks and ledges which lie outside of it. It is also much frequented by Canadian and American fishing vessels which run in here for shelter or to await a change of wind. The cod and lobster fisheries are followed extensively in the vicinity.

The harbour is formed by Piscatiqui, George and Grassy Islands on the east, and by Durell Island and the mainland on the west. Cutler Island and the shoals between it and Durell Island protect it from the north, and Burying Island and the bar uniting it with Lanigan Point from the south-east.

The clay banks of Burying Island have been gradually wasting away until only a very small portion of it remains above high water. Its destruction would have transformed it into a dangerous reef, and have left the harbour exposed to the swell from the Atlantic. It became necessary therefore to protect the remains of the island by a breakwater. This work was begun in 1880 and finished in 1882. It is 290 feet long and formed of strongly framed crib work packed with stone and protected on the ends and seaward side by slopes of heavy stone. Its cost has been \$9,000. Spring tides rise $6\frac{1}{2}$ feet, and neaps $4\frac{1}{2}$ feet.

GUYSBOROUGH.

Guysboro' Harbour at the head of Chedabucto Bay is an extensive inlet running northward eight and a half miles to the head of the tide where it is crossed by a bridge. It is navigable for ships up to "The Narrows," four miles from the entrance, and for small vessels three miles further, while boats can ascend as far as the bridge. The entrance channel is narrow and crooked, with tides running from four to five knots. There are two bars, the outer with 17 feet at low water, and which is rendered impassable by breakers in heavy weather, and the inner with 13 feet in a channel only 250 feet wide.

In 1877-78 the sum of \$1,413.53 was expended in widening the channel at Stony Patch Point between the two bars.

Tides rise $6\frac{1}{2}$ feet springs and $3\frac{1}{2}$ feet neaps.

[RAGGED POND.

Ragged Pond, on the north side of Chedabucto Bay, about six miles east of Guysborough Harbor, is a triangular sheet of water, with an area of about 180 acres

and a depth of from two to five fathoms. It is enclosed by shingle beaches, through which there is a narrow channel on the western side of Ragged Head, by which boats can enter at high water.

In 1879 \$3,991.43 were spent in widening and deepening this channel, and in partially protecting the sides with cribwork and brush. In 1880-81 a further grant of \$1,500 was made for the purpose of completing the work, but the result of former operations was found to be so unsatisfactory that it was not considered advisable to make any further expenditure.

Where ponds of this nature exist, the temptation to try and make them available as harbours is very great, especially on a coast where natural harbours are distant from each other; but it is only under a combination of most favourable circumstances that any good results can be obtained, and most attempts to keep open navigable channels have ended either in total failure, or at best in very partial success. Total expenditure by the Department, \$4,491.43.

PORPER POND.

Porper Pond is on the north side of Chedabucto Bay, about 10 miles east of Guysborough Harbour. In 1874-75 the Department expended \$5,119.09 in opening a passage into the pond in order to provide a harbour for fishing boats.

OYSTER POND.

Oyster Pond, Guysborough County, is one of several large ponds on the north shore of Chedabucto Bay, which form the only boat harbours between Cape Argos, at the entrance of the Gut of Canso, and Guysborough Harbor, a distance of 15 miles.

Oyster Pond is 12 miles east of Guysborough Light.

The sum of \$2,000 was expended in 1876 in deepening the entrance channel and protecting the tides with cribwork, which was repaired in 1879, making a total expenditure of \$2,250.01.

PORT MULGRAVE.

Port Mulgrave, Guysborough County, is on the western side of the Gut of Canso and is now the terminus of the Eastern Counties Railway. In 1873 the sum of \$782 was expended in deepening the cove by dredging.

ARICHAT.

West or Little Arichat, or Acadiaville, is situated on Ile Madame, inside of Creighton Island, Richmond County. The approach is from the west over a bar having 17 feet at low water. The mouth of the harbour half a mile within this bar is 900 feet wide. Formerly the eastern end of the harbour was closed by a beach of shingle 200 feet in width and standing about 15 feet above high water. It is said that the water was so bold on the inside that the vessels of 500 tons could lie close to the shore and take in ballast with planks. Probably this removal of the stone assisted in the destruction of the bar which was completed by a severe storm in July, 1839. Since then the remains of the bar have been gradually working towards the harbour, until the highest part, which is only a few feet above low water, was, in 1870, some 75 or 800 feet west of its former position. South-westerly storms washed sand and shingle into the channel, which was fast becoming shallow.

To preserve the harbour it was therefore necessary to replace the former beach by a breakwater.

The width of the opening between Creighton Island and the mainland is 1,285 feet. The Government of Nova Scotia, previous to 1867, had constructed a breakwater 58 feet long, partially closing the gap. The remaining length was completed by the Dominion Government, in 1879, at a cost of \$9,694.29.

West Arichat Harbour, though of limited size, is easy of access and completely sheltered from all winds. The cod and other fisheries are extensively prosecuted.

PETITDEGRAT.

Petitdegrat Inlet lies between Petitdegrat Island and the south-east end of Ile Madame. It is three miles long and has water enough for large vessels, but the rocks are numerous and the channel narrow. The fisheries are extensively prosecuted and its shores are occupied by fishermen. The southern end of the inlet opens on the Atlantic and its northern end is separated from Rocky Bay by a beach of shingle, through which there is a narrow channel passable by boats. The sum of \$3,000 has been expended in improving the passage so as to enable boats to go through at all times of tide.

D'ESCOUSSE HARBOR.

D'Escousse Harbour, on the north side of Ile Madame, lies inside of Bernard Island, at the eastern end of Lennox Passage. The harbour, which is about half a mile long by one quarter of a mile wide outside the one-fathom lines, has a depth of from $2\frac{1}{2}$ to 3 fathoms over a great part of its area and is well sheltered from all quarters. The principal entrance is from the eastward, through a narrow and moderately curved channel. In 1872-3 this channel, which had in some places only $7\frac{1}{2}$ feet at low-water, was improved by dredging, at a cost of \$2,535.20. There is a narrow passage with only 2 feet at low-water, leading from the head of the basin into Poulament Bay, which is itself a secure and capacious harbor. The tides rise from 4 to 6 feet.

L'ARDOISE.

L'Ardoise, Richmond Co., lies on the eastern side of Chedabucto Bay, about nine miles south-east from St. Peter's Canal. In 1876 \$10,330 were expended in constructing a breakwater 400 feet long, the design being to provide shelter for the fishing boats frequenting the Bay.

GABARUS.

There is a small boat harbour at the head of Gabarus Bay, Cape Breton County, which, though of limited area, is of great value to the fishermen. Formerly boats could enter only at high water, there being a depth of but one foot in the channel at low water. The sum of \$3,175 00 has been expended at different times in deepening the channel to 3 feet at low water, equal to 7 feet at ordinary high water.

MAIN-À-DIEU.

Main-à-Dieu Harbour is a cove of circular shape, near the eastern point of Cape Breton Island. It is about one quarter of a mile in diameter and has a depth of from 10 to 13 feet at low water. It is open to the south, but is sheltered by Scattarie Island and the reefs in the bay, so that it affords safe anchorage to colliers and fishing schooners drawing less than 10 feet of water, and by which it is much frequented as a harbour of refuge. Gales from the eastward throw in a heavy undertow, or ground swell, which would cause vessels of larger draught to strike the ground. To break this swell it is proposed to build a breakwater 800 feet long, extending from Burke's point on the eastern side of the entrance to "Harbour Rock," which lies nearly in the centre of the channel. A length of 180 feet has been built in 1881 and 1882 at a cost of \$8,596.22.

Tides rise from $5\frac{1}{2}$ to $3\frac{1}{2}$ feet.

COW BAY.

Cow Bay, or Morien Bay, is on the eastern coast of Cape Breton Island, about 8 miles south-east of Sydney, and owing to the extensive coal mines in its immediate vicinity, is a place of considerable importance.

The bay is $2\frac{1}{2}$ miles wide at its mouth and, being completely open to the Atlantic, affords no safe anchorage during easterly winds.

The danger to which vessels were exposed, and the losses from wrecks—from four to six annually—were so serious that the proprietors of the Gowrie Mines, Messrs. Archibald & Co., decided upon the construction of a breakwater for the shelter of vessels during storms. In this they were aided by the Nova Scotia Government to the extent of about one-fifth of the outlay.

The breakwater is on the north side of the bay, and when first visited by an Engineer of the Department, in 1868, was 1,380 feet long, and 50 feet wide, with 20 feet of water at the outer end. The area of the basin enclosed between the breakwater and the loading wharf of the mines was fully 17 acres, 10 acres of which had a depth from 9 to 20 feet at low water.

In 1873-74, \$10,004.96 were expended by the Department in strengthening the breakwater. The work was vigorously prosecuted and was about half completed when, on 24th August, 1873, a disastrous gale occurred which seriously damaged it. After the storm operations were resumed, the balance of the grant being largely supplemented by Messrs. Archibald & Co.

By Order of Council, 26th September, 1874, the Messrs. Archibald's interest in the breakwater was purchased for \$26,000, the Chief Engineer's estimate of the amount expended by them being \$96,519, and on 14th May, 1875, a contract was entered into for the repairing and strengthening of the structure for the sum of \$47,640. This was completed in July, 1877. In November of the same year and in the following May gales damaged a portion of the old work. In 1878-79 the necessary repairs and some additions were made, among which was a new block 70 feet in length. In 1880 a block, 80 feet by 30 feet, was built on the seaward side of the outer end, and, in 1881, a new counterfort 40 feet square was added and some repairs made to the face.

The total expenditure at this place by Department has amounted to \$127,444.10.

Owing to its very much exposed position, the breakwater is always liable to severe injury by easterly storms. The ballast from vessels arriving at the port is cast over the outside and is gradually forming a beach which will tend to break the force of the waves, but as much of the material is earth or fine sand, the process is a slow one, though it has been aided by throwing in a quantity of heavy stone procured in the vicinity. It is also to be feared that the sea worms are at work on the inner face and that their operations will, in time, be the cause of most serious trouble and expense.

The wharfage collected by the Department of Marine and Fisheries from vessels discharging ballast at the pier, amounts to nearly \$3,000.00 annually.

PORT CALEDONIA.

Port Caledonia or Schooner Pond is on the northeast coast of Cape Breton Island, and lies about 15 miles east of the entrance to Sydney Harbour. A branch of the Cape Breton Railway runs to this place, and during the past year the Department has expended \$1,348.20 in deepening the channel into the harbour in order to admit a larger class of the vessels engaged in the coal trade.

LITTLE GLACE BAY.

Little Glace Bay, five miles south-east of Lingan, is a harbour formed by the space enclosed between two long piers which were built by the coal mining companies. In 1880 and 81-82 the sum of \$4,755.56 was expended by the Department in deepening the entrance by dredging.

LINGAN.

Lingan, or Bridgeport Harbour, is at the head of Indian Bay, on the north-east coast of Cape Breton Island, about five miles east of Flat Point Light, at the entrance

of Sydney Harbour. The pond is nearly a mile square, with a depth of eight feet at low and eleven feet at high water. The channel leading into this basin was narrow and crooked, having a depth of from seven to fifteen feet at low water.

In 1877 a brush breakwater 1,900 feet in length was constructed on the sand beach which separates the harbour from Indian Bay, and through which the sea during easterly gales had made several breaches, threatening its entire destruction.

In 1878, 79 and 80 the channel at the entrance was straightened and deepened by dredging, thus admitting vessels of larger draught to load coal from the Lingan mines. The total cost of these works has been \$13,253.70.

SYDNEY.

Sydney Harbour is on the north-east coast of Cape Breton. It is three miles wide at the mouth but at five miles within the lighthouse on Flat Point the navigable channel contracts to the breadth of half a mile between the two bars of sand and shingle which extend from the shore on either side. Inside these bars the harbour divides into two arms, the west and the south. The harbour is easy of access and is capable of containing any number of the largest vessels in safety. It is closed by ice between the end of December and the beginning of May.

The Town of Sydney stands on the east side of the south arm and is the shipping place for several coal mines. In 1878, \$10,658.09 was expended by the Department in removing 30,100 cubic yards of sand and gravel from a shoal lying off the loading pier of the Cape Breton Railway and Coal Company. In 1881, 24,500 cubic yards were removed from the same place, at a cost of \$7,122.63.

North Sydney, distant five and a-half miles, is on the north side of the west arm and is also a point of shipment for large quantities of coal. The anchorage is sheltered by the North Bar. North-westerly winds throw a heavy sea upon the bar, and wash the sand into the harbour. To stop this encroachment, and at the same time to provide ballast ground, which is much needed, it has been in contemplation to build a breakwater on the bar. A portion of the design was carried out last year by the expenditure of \$2,000 by the Department in conjunction with a like amount furnished by the Harbour Commissioners.

BENACADIE POND.

Benacadie Pond, Cape Breton County, lies at the south-west angle of the peninsula which divides East Bay from the Little Bras d'Or Lake. It is about a mile and a-half long, and one-sixth of a mile wide, and has a depth inside of from nine to twelve feet. The mouth is obstructed by a bar of sand, and works are now in progress for its improvement. Total expenditure by the Department, \$716.20.

BIG POND.

Big Pond is situated on the south side of the East Bay of Bras d'Or Lake. It is a large sheet of water, of good depth, separated from the lake by a beach averaging 50 feet in width and four feet in height, composed of sand and shingle, with a substratum of clay. The Pond would make a harbour suitable for coasting vessels were it possible to keep it open. In 1874-75 a cutting was made from the lake into the Pond, and the sides protected with crib work, but there being no large streams discharging into the Pond the slight rise and fall of the lake did not produce sufficient scour to keep the opening clear, and it was soon choked. The cost of the works was \$2,500.

INDIAN ISLANDS.

Indian Islands, Cape Breton County, are a group of small islands on the north coast of the East Bay of the Great Bras d'Or Lake. The outer islands are connected to the shore by a shingle beach. A cutting through this beach now enables the

fishermen residing at Eskasoni to reach the fishing grounds by a short run in smooth water instead of going round outside the islands as formerly. The cost of opening this channel and protecting the sides with crib work has been \$2,196.45.

INGONISH.

Ingonish Bay, Victoria County, lies on the north east coast of the Island of Cape Breton, midway between Sidney Harbour and Cape North. It is divided into North and South Bays by Middle Head, a narrow, rocky and precipitous peninsula more than two miles in length. At the head of South Bay there are two ponds, one of fresh and the other of salt water, enclosed by shingle beaches, and having common outlet. Easterly winds throw a heavy sea into the bay and it affords no safe anchorage. The depth in the entrance to the pond at the head was only 5 feet and boats could not enter except at high water.

In 1873 works were undertaken by the Department for the purpose of deepening the channel to 15 feet at low water, equal to from 18 to 20 feet at high water, widening it from 60 feet to 200 feet, and constructing a breakwater 700 feet long for the protection of the new channel.

This work was completed in 1876 at a cost of \$84,397.20, and the salt water pond which contains about 400 acres, now affords a safe and commodious harbor for fishing and coasting vessels. Since then the sum of \$2,306.50 has been expended in maintenance and repairs, making a total expenditure of \$86,703.70.

The mountains in the rear of Ingonish are the highest on this coast, attaining an elevation of 1,390 feet. Smoky Cape (Cap Enfumé) the southern point of the bay rises precipitously from the sea to the height of 950 feet. The squalls from these high lands are at times very violent.

CHETICAMP.

Cheticamp Harbour on the north-west coast of Cape Breton, about mid-way between Capes Mabou and St. Lawrence, lies between Cheticamp Island and the main land. There is a depth of 20 feet within the harbor, but formerly there was only 2 feet at low water on the bar at its entrance. This has been increased to 9 feet, equal to 12 feet at high water, by the removal of 54,135 cubic yards of sand and gravel at a cost of \$11,731.08.

Herring, cod and mackerel abound on the coast. The Messrs. Robin & Co., of Jersey, have a large fishing establishment at this place.

MARGAREE.

Margaree Harbour, at the mouth of the Margaree River, Inverness County, is on the north-west coast of Cape Breton, about 30 miles north-east of Port Hood. It has a narrow and intricate channel, through which the tides run at the rate of 4 knots and its entrance is obstructed by a bar having only 5 feet over it at low and between 7 and 8 feet at high water. The surf on the bar is at times heavy and dangerous.

Some years before Confederation the Government of Nova Scotia constructed piers for the improvement of the entrance, and in 1876 the Department expended \$3,000 in repairing and extending these works. In 1879 a further grant of \$3,000 was employed in building an additional length of 140 feet. Total amount expended \$6,000.

The Margaree River is celebrated for its salmon fishing.

MABOU.

Mabou Harbour, Inverness County, is six miles northeast of Port Hood. The entrance was formerly at the southern end of a range of sand hills. The bar had only four feet over it at low water. From the bar the channel ran east-southeast for about 1200 feet, then turned abruptly to the north, following the inner side of the

sand hills for about the same distance and then made another sharp turn to the southeast for a distance of about 4,000 feet when the channel, to this point not more than 150 feet wide and 10 feet deep, expands into a fine basin two and a half miles long and from one-quarter to one-half a mile wide inside the ten foot lines, and having a depth of from two and a half to four fathoms, over a large part of its area.

In 1870, a survey was made and a report submitted (Departmental Report, 1870, page 63), on the project of opening a new channel by cutting through the sand hills at their northern end and closing the existing entrance.

This work was begun in 1871 and proceeded with, during the following eleven years, a sum of (\$89,090.57) being expended.

The original scheme has not as yet been fully carried out, but as far as can be judged from present results, the works promise success. The new channel is straight, has a fair depth of water and is in every way a great improvement on the former entrance which is now entirely closed by a sand beach, 800 or 900 feet in width.

During the past year, \$8,765.19 have been expended in partially opening a channel through a reef of hard clay and stone which lies outside the new entrance.

PORT HOOD.

Port Hood, said by Admiral Bayfield to be "the only safe anchorage on the west coast of Cape Breton, north of the Gut of Canso," from which it is distant about twenty miles, was formerly a very secure harbour. Smith's Island, which is two miles long, forms its western side, and was then connected at the northern end with the mainland by a range of high sand hills between 3,000 to 4,000 feet long. In July, 1839, a heavy gale from the north made a breach in this protection. The opening was at first very narrow, and might perhaps have been closed, but it was neglected, and the tidal currents, aided by the fishermen who found it a convenient passage, enlarged it with increasing rapidity until the sand hills were entirely swept away and their site is now covered by fifteen feet of water. The harbour is unsafe during north-easterly winds, except in the small bay near Smith's Island, and this only remaining shelter appears in some danger of destruction by the cutting of the sea through the narrow ridge of soft sandstone which protects it on the north.

A pier, 550 feet long with an L 100 feet by 25 feet, was built on the eastern shore of the harbour in 1865 or 1866 by the Provincial Government. When first taken in charge by the Department it was in want of repairs. In November, 1871, a portion 200 feet in length was destroyed by a storm. During the two following seasons this part was rebuilt, other necessary repairs made and a new block, 125 feet by 25 feet, built at the outer end. The cost of these works was \$15,505.00.

In 1877-78-79 \$1,892.07 were expended in keeping the pier in repair. In October, 1879, in August, 1880 and again in November, 1881, gales severely injured the work. During all this time repairs were in progress, the expenditure amounting to \$4,000, making a total outlay by the Department of \$21,397.07.

The pier stands exposed to the full force of north easterly storms which are very violent on this coast, the trend of the shore, north of Cape Linzee, to the eastward, leaving it open to the whole length of the Gulf of St. Lawrence. The timber below water is so much weakened by the *teredo navalis* or shipworm that it is almost useless to attempt further repairs. A plan for the complete reconstruction of the pier and its protection from both sea and worms by slopes of heavy stone is under consideration.

HAVRE BOUCHE.

Havre Bouché, Antigonish County, is a small harbour on the south shore of St. George's Bay, between Cape Jack and the northern entrance of the Gut of Canso. Its mouth is narrow and had formerly only four feet at low water with a rise of tide of from two to four feet. It has no bar outside and a depth of inside of 13 or 14 feet. In 1877-78 the sum of \$2,498.48 was expended in deepening and widening the channel at the entrance. It now forms a convenient place of refuge for small vessels waiting for a leading wind through the Straits of Canso.

TRACADIE.

Big Tracadie Harbour, Antigonish County, is situated on the southern shore of St. George's Bay, about four miles E.S.E. from Pomquet Island. It is an extensive sheet of water from 10 to 14 feet deep over a large part of its area. The entrance was formerly at the west end of Delory Island which lies across its mouth. The channel was narrow and crooked and was obstructed by a dangerous bar of gravel and stones with only 2 feet on it at low water. It was therefore accessible only by boats or very small vessels at high water when the depth was from 4 to 6 feet.

In 1863 the Provincial Government opened a passage into the harbour at the east end of Delory Island, about a mile and a quarter from the old mouth, by cutting through the spit which connected the Island with the mainland and constructing a breakwater 60 feet square on its eastern side. An examination made in 1870 showed 8 feet in the new channel at low water.

In 1874 and 1875 the Department expended \$12,690.67 in re-building and extending the breakwater and in the construction of a breastwork to protect the western side of the channel from the action of the tidal currents. In 1877 \$873.70 were spent in repairing damage done by a gale, and in 1878 \$675.26 in dredging a sand-bar which had formed outside the mouth. The harbour is a safe and commodious one for the class of vessels generally used in the shore fisheries and the smaller coasting craft. Total expenditure by the Department since Confederation, \$13,564.37.

BAYFIELD.

Antigonish County, on the south-west of St. George's Bay, is distant 17 miles south from Cape George. The harbour is formed by Pomquet Island and the outlying reefs. Pomquet Island is about three-quarters of a mile long and is separated from Pomquet Point on the mainland by a strait 1,850 feet wide at high water. At low water the reefs dry out from the island and the point, leaving a passage 400 feet wide, with only 4 feet of water in it. The closing of this opening would complete the shelter of the roadstead from all points except between north-east and east. The tides rise from 2 to 4 feet.

In 1879 a portion of the proposed breakwater, 400 feet in length, was built at a cost of \$4,888.28.

ANTIGONISH.

Antigonish Harbour, on the west coast of St. George's Bay, 13 miles south-south-west of Cape George, runs inland seven miles, the channel having in some places a depth of five or six fathoms, though it is shoal at the upper end. The entrance is obstructed by a bar of sand, on which there is only six feet at low water with a rise of tide of from 3 to 4 feet.

The surrounding country is fertile and thickly settled. Large shipments of cattle, sheep and farm produce are made annually to Newfoundland.

The Department has expended \$3,649.15 in deepening the upper reach of the harbour by dredging.

MC NAIR'S COVE.

McNair's Cove, or more properly, Ballantyne's Cove, Antigonish County, is about five miles south-west of Cape George. It is open to St. George's Bay, between south-east and south-west. It is sheltered by Cape George from north-easterly winds, but these if of long duration throw in a heavy ground swell. The Cove is resorted to a good deal during the fall months by fishing boats and small vessels seeking shelter from storms.

In 1872 a contract was made for the construction of a breakwater 400 feet long extending from the northern point of the Cove, in order to break the undertow during north-easterly gales. This work was completed in November, 1873. I

1875, the pier which had settled into the soft bottom, was built up to its proper height. In 1878 a new block was placed at the outer end, and some repairs made to the older parts of the work.

The total expenditure at this place has been \$33,127.45.

ARISAIG.

The breakwater at Arisaig, Antigonish County, was an old and somewhat dilapidated structure, when it came under the charge of the Department, in 1870. It was put into thorough repair in 1873, at a cost of \$2,583, and during the past two years \$300 more have been expended in repairing damage done by the ice to which it is much exposed.

The pier is about 350 feet in length, and the work would be of little importance were it not that there is no other place of refuge for fishing boats between Cape George and Merigomish, a distance of 31 miles. Arisaig is midway between these points, and affords shelter from easterly winds, but none from winds between north and west. The cove was capable, at some expense, of being made a safe harbour of refuge, but the present works, built before Confederation, are not very judiciously located.

MERIGOMISH.

Merigomish Harbour, Pictou County, is between nine and ten miles south-east of Pictou Light. It has 14 feet at low water over its bar, and a sufficient depth inside for vessels of large tonnage, but the entrance is difficult and intricate. The harbor is of great extent, running five or six miles to the eastward, and four miles to the westward of the mouth. The bay is full of islands, coves and headlands, which with the background of mountains rising 800 or 900 feet above the sea, form scenery of great beauty. Before the timber was exhausted this harbor was frequented by shipping, but is now seldom visited by anything larger than a coasting schooner.

In 1880 a wharf, 150 feet long, was built in the cove east of Hardwood Point for the purpose of facilitating the shipment of farm produce, etc.

The cost of this work was \$1,065.60.

NEW GLASGOW.

The town of New Glasgow is situated on the East River, one of the arms of the Pictou River, seven and a half miles above the town of Pictou. Owing to its proximity to the coal mines, it is a place of considerable trade. It is also the junction between the Pictou branch of the Intercolonial Railway and the Eastern Counties Railway. Large ships are built here and taken down the river, at high water. About two millions feet of lumber are cut annually in the mills. In 1880-81-82, the Department expended \$5,705.09 in deepening the channel in front of the town by dredging.

PICTOU.

Pictou Harbour is pronounced by Admiral Bayfield to be in every respect the finest on the southern shore of the Gulf eastward of Gaspé. It is situated at the head of a bay which is $1\frac{3}{4}$ miles wide and $1\frac{1}{2}$ miles deep. The mouth of the harbour is about one-quarter of a mile wide, and there is a depth of from 30 to 40 feet in the channel as far as the town, which stands on the north side two miles from the light house. The flats, however, extend some distance beyond the ends of the wharves. On the south side is the terminus of the Pictou Branch of the Intercolonial Railway, the principal point of connection between Nova Scotia and Prince Edward Island.

Opposite the town the harbour divides into three large arms called the East, Middle and West Rivers. The last two may be navigated without much difficulty for two or three miles above their confluence, but higher up they become divided into several small channels obstructed by oyster beds.

The West River runs through a beautiful and well cultivated valley containing a large population. The East River is navigable by large vessels for a distance of three miles from Pictou, to the loading place of the Albion Mines. The channel has an average width of 550 feet. Half a mile below the loading place is a bar with 12 feet least water, and a short distance above, the channel is obstructed by old oyster beds. Since 1873 the Department has expended \$19,559.53 in improving the East River, \$996.39 in Middle River, and \$18,116.23 in deepening the water at the railway wharves and the loading piers of the several coal mines.

PICTOU ISLAND.

Pictou Island, in the Straits of Northumberland, and about 10 miles north-east of Pictou light, is five miles long by one and a half wide. It rises in the central part to a height of 150 feet above the sea. There are twenty-five families living on the Island who support themselves by fishing and farming.

A small pier 150 feet long was built near the west end by the Provincial Government to serve as a landing place for boats. This structure, having been much damaged by the sea and ice, was repaired and strengthened by the Department in 1880 at a cost of \$745.49.

RIVER JOHN.

The River John, Pictou County, falls into John Bay, four miles south-east of Cape John. It formerly had only 1 foot at low water over its bar of sand, and an irregular depth of from 3 to 11 feet in a very narrow channel up to the bridge, a distance of about a mile.

In 1878 operations were begun for improving the channel and have been continued annually since. Up to the 30th June last 78,337 cubic yards of mud and sand had been removed at a cost of \$18,614.02.

There are flourishing settlements on both sides of the river and several ship-yards and saw mills.

TATAMAGOUCHE.

During the summer of 1881, \$3,323.79 were expended in dredging the Tatamagouche River, Colchester County. The work done consisted in opening a channel through the flats up to Patterson's wharf, and in deepening and otherwise improving the western branch of the river as far as Campbell's mills. In 1882, \$2,095.05 were expended in dredging a channel through the bar at its mouth.

WALLACE.

In 1879 and 1880 \$9,908.28 were expended in deepening and otherwise improving the channel of the Wallace River, Cumberland County.

PROVINCE OF NEW BRUNSWICK.

CAMPOBELLO.

The Island of Campobello, which is about 8 miles long, with an average width of about two miles, lies at the mouth of the Bay of Fundy. In 1874, the sum of \$1,000 was appropriated by Parliament for the construction of a breakwater, at Wilson's Beach on the north-west side of the Island, with the understanding that the local authorities were to furnish a like amount. Owing to a failure on the part of the latter to keep their agreement, the work was left unfinished. In 1876, an

amount of \$600 00. was expended by the Department in conjunction with a grant from the Provincial Legislature, and, in 1878, the work was completed and a connection made with the shore in order to shut out the sea from the north. The total expenditure by the Department has been \$2,807.11.

The tides rise here from 18 to 22 feet.

DIPPER HARBOUR.

Dipper Harbour, St. John County, is about 21 miles west of Partridge Island, at the mouth of St. John Harbour, and on the eastern side of Point Lepreau. In 1874, a breakwater, 450 feet long, was built on its western shore. The structure was much damaged by a destructive gale which visited the Bay of Fundy in the winter of the same year. The total expenditure has been \$22,244.52.

ST. JOHN HARBOR.

St. John Harbor, the estuary of the River St. John, is on the north side of the Bay of Fundy.

The distance between Red Head and Negrotown Point, on the eastern and western sides of the mouth respectively, is two miles. Partridge Island, which lies a little more than half a mile outside a line drawn between those Points, divides the entrance of the harbor into two channels, the eastern about 9,500 feet wide, and the western 3,250 feet wide.

With south-easterly winds, the sea is broken by Inner Mispeck Point, which bears south by-west, two miles from Red Head, and south-east-by-south, the same distance from Partridge Island, and by the shoal water, between Red Head and the main channel. South-westerly winds threw in a heavy sea through the western channel, which rendered it difficult for vessels to enter the harbor as they were in danger of being driven on to the "foul ground," on the eastern side of the channel. During 1874 and 1875, a thorough survey of the harbor, with close and accurate soundings, was made by the Engineers of the Department. In the spring of 1875, a breakwater, 2,250 feet long, to partially close the western channel, was begun, and in September, 1877, completed. During the two years following, the breakwater was subjected to severe tests, especially by the gales in November, 1877, December, 1878, and January, 1879, with no other result than such settlement and consolidation of the stone slopes as had been anticipated. This subsidence of the stone exposed the cribwork in the heart of the structure, and while preparations were in progress for raising the slopes as soon as the season would permit, a violent storm, on the 11th and 12th February, 1879, carried away 1,300 feet of the wooden top, down to from two to four feet below high water mark. Temporary repairs were made in 1879, 1880 and 1881 in order to prevent further damage. The cost for construction, repairs and maintenance has been \$256,150.99. In October last, a contract was made for the re-building of the top with heavy stone, and the construction of a circular stone pier, for a lighthouse at the outer end. This work is now in progress.

In 1872-3, \$4,251.50 were expended in dredging the Ferry Slip on the eastern side, and Navy Island Bar on the western side of the harbour. Last summer, \$2,754.17 were spent in improving the channel leading to the Ferry Slip on the western side. From 1876 to 1880 a dredge was employed in deepening the water at the new terminus of the Intercolonial Railway. The amount expended was \$32,888.51, of which the Railway refunded \$31,412.02.

MADAWASKA.

The River Madawaska rises in Lake Temiscouata, and falls into the river St. John, at Little Falls, now called Edmundston. In 1870, a survey was made of the river, with a view to the improvement of the navigation, and a Report and estimates submitted. (Departmental Report, 1871, Appendix No. 18.) During the past year \$1,037.06 has been expended in improving and repairing the tow-paths and bridges along the banks between Edmundston and Lake Temiscouata.

TOBIQUE.

The River Tobique is the largest of the tributaries of the St. John, into which river it falls from the east, about 20 miles below Grand Falls. About 80 miles above the confluence it is divided into four branches, the southern of which approach within a mile of the sources of the Mirimachi; while the northern are interlaced with the tributaries of the Upsalquitch and Nipisiguit. About a mile from its mouth, there is a rapid called the "Narrows." At this place, the river passes between perpendicular cliffs from 50 to 100 feet in height. Through this chasm, which is a mile long and only about 150 feet wide, the water rushes with great violence, rendering the pass unnavigable during freshets. For 10 miles above, or as far as the "Red Rapids," which are caused by a rocky ledge, the water runs with a moderate velocity; 20 miles further up, a tributary called the Wapskehegan, which is navigable for canoes 20 miles, flows in from the south; 10 miles above the Wapskehegan, there is a peculiar bend in the river known as the Oxbow, and 3 miles above that it receives another large tributary called the Gulquac, which is navigable for canoes 25 miles. The Tobique itself can be navigated by tow-boats and canoes for 100 miles from its mouth. Between its head waters and those of the Nipisiguit, there is a portage 2 miles in length.

In 1880 and 1881, the Department expended \$2,000 in improving the navigation by blasting and removing ledge rock and boulders from "the Narrows," "the Red Rapids," "the Oxbow," the mouth of the Gulquac, and some minor places.

FREDERICTON.

Fredericton, the capital of New Brunswick, stands on the western bank of the River St. John, about 80 miles above its mouth. Here the Fredericton branch of the St. John and Maine Railway has its terminus, which is connected with that of the New Brunswick Railway, on the east side of the river, by a ferry. During 1874, 1875 and 1876 the Department expended \$7,699.15 in deepening the water in front of the public wharves by dredging.

OROMOCTO.

(See River Saint John).

SAINT JOHN RIVER.

The Saint John, the largest River in the Maritime Provinces, was discovered by De Monts, on 24th June, 1604. It takes its rise in the State of Maine near the sources of the Penobscot and Connecticut Rivers, and falls into the Bay of Fundy, at the City of Saint John, after traversing a distance of about 500 miles. The navigation may be divided into three sections. The first, seventy-five miles in length between the mouth of the St. Francis, where the river first touches British territory and the Grand Falls, to within two miles of which latter point it forms the boundary line between Maine and New Brunswick. The second, 140 miles in length, between Grand Falls and Fredericton and; and the third, 80 miles in length, between Fredericton and St. John. The influence of the tide is felt as far as Chapel Bar, ninety miles from the mouth of the river.

The first section is now navigated only by tow boats, though for two or three years, about 1846 to 1849, a small steamer called the "*Madawaska*" plied occasionally between Grand Falls and St. Francis.

The second section is navigable by stern wheel steamers during high water in the spring and autumn, and by tow-boats at all times when it is open. The rapidity of the current prevents the employment of sailing vessels beyond Springhill, six miles above Fredericton. The third section is navigable by steamers and sailing vessels, except when closed by ice.

A description of the river, between Edmundston, forty-five miles above Grand Falls, and Fredericton, and the obstructions existing in 1870, will be found in the Departmental Report of 1871, appendix No. 18.

As early as 1826, the attention of the Legislature of New Brunswick was drawn to the necessity of improving the navigation above Fredericton, and up to the time of Confederation between \$75,000 and \$80,000 had been expended for that purpose.

In 1872, the Department repaired the tow paths both above and below the Grand Falls.

In 1873 a number of large boulders were removed from the channel at various points between Andover, two miles below the confluence of the T.ique, and Fredericton, a distance of 118 miles. In 1874 similar operations were carried on over the whole distance, between Grand Falls and Fredericton. In 1875, the work was confined chiefly to the improvement of the Meductic Rapids. In 1880-81, the amounts appropriated were expended between the mouth of the Rivière des Chutes, eleven miles below Andover, and Bear Island, about 39 miles above Fredericton. In the same year, \$1999.12 were spent between St. Francis and Grand Falls in repairing the towpaths, removing obstructions and building a wing-dam near Edmundton.

The result of the operations between Andover and Fredericton is said to be equal to a gain of from 10 to 15 inches in the depth of the water. The amount expended by the Department in these improvements has been \$33,439.45, including small sums paid annually for the removal of "snags" from the shoaler parts of the river below Fredericton.

The Oromocto shoals are situated about ten miles below Fredericton. They have always been a serious impediment to the navigation of the river, and prior to Confederation, the Provincial Government had expended large sums in attempting, without permanent results, to open a channel by dredging. In 1873-75-77, the Department employed \$16,918.10 in making a cut through the shoal over a mile in length.

The river at this place is divided into three channels by Oromocto and Thatch Islands, the navigable channel being between the two islands. It has been recommended to close the openings to the east of Oromocto, and west of Thatch Island by dams which would act only when the water has fallen to ordinary summer level, thus forcing the whole volume to pass down the central channel with a slightly accelerated velocity which would carry matter held in suspension past the shoals. The structures being deeply submerged during freshets, would not be exposed to injury by ice or floating timber.

In December, 1877, a contract was made for the construction of a dam 1,600 feet in length, extending from the western shore towards the head of Thatch Island. This was finished in August, 1879. In the autumn of 1879, \$4,591.64 were expended in dredging. In 1880-81, an addition of 600 feet was made to the dam, thus completely closing the channel west of Thatch Island. During the past summer, \$1,161.38 were expended in dredging.

The result of the operations, as shown by soundings taken in January last, is on the whole satisfactory, showing a channel with 9 feet at lowest water from the head of the shoal down nearly to the foot of Thatch Island, where the depth decreases to 8 feet. This is a gain of 2 feet in depth over nearly the whole distance. It will, however, require another season to determine the full effects of the work, and to decide what further steps, if any, are necessary.

The cost of the sheer dam has been \$13,559.56. Total expenditure by the Department since Confederation, \$48,118.77.

GRAND LAKE.

Grand Lake, in Queen's County, is thirty miles long, and from three to six in breadth. Its outlet into the River Saint John, called the Jemseg, is about thirty miles below Fredericton. Salmon River, which falls into the head of the lake, is a good sized stream rising in the same highlands as the Richibucto River, which flows

in the Gulf of St. Lawrence. In 1875 and 1876, the Department expended \$6,375.44 in dredging "Beard's Bar," which obstructed the mouth of the stream.

The Jemseg is a narrow, deep channel about three miles in length. In 1874 and 1875, \$10,256.88 were expended in straightening the entrance by dredging out 45,720 cubic yards of tough clay and mud.

Coal mining is carried on to a limited extent at various points in the vicinity of the lake. The coal finds a market chiefly in St. John and Fredericton.

WASHEDEMOAK.

Washedemoak Lake is merely an expansion of the River of the same name which flows into the St. John, thirty-six miles below Fredericton. The Washedemoak River, has a course of between sixty and seventy miles, rising in the same highlands as the Rivers Cocagne and Buctouche, which fall into the Straits of Northumberland.

The lake is navigable for steamers for a distance of about twenty-five miles from its outlet.

During 1878 and 1879 \$6,340.83 were expended in improving the channel at a place called "Perry's Flats."

BLACK RIVER.

Black River, St. John County, is on the north side of the Bay of Fundy, about 12 miles east of the entrance to St. John Harbour. In 1879, the sum of \$3,907.40 was expended in the construction of a breakwater, 160 feet in length, near the mouth of the stream, in order to provide shelter for coasting and other vessels frequenting the Bay.

TYNEMOUTH CREEK.

Tynemouth Creek, St. John County, is situated on the north coast of the Bay of Fundy, about 21 miles east of St. John Harbor. In 1875, the sum of \$2,500 was expended by the Department in the construction of a small block of cribwork for the purpose of facilitating the entry, into the inner harbor, of vessels seeking refuge from storms.

QUACO.

Quaco Bay is on the north coast of the Bay of Fundy, about thirty miles east of the Harbor of St. John.

The shore is in the form of a semi-circle, open to the south-east, the distance from Quaco Head to Maccumber Point being little less than two miles, and the depth of the bay from a line drawn between these headlands about one mile. The sounding within this area give from 5 to 9 fathoms at low water, and the western side of the bay affords good anchorage and fair shelter with south-westerly winds.

The Harbour proper, which lies on the north-eastern side of the Bay, is a basin at the mouth of a small river, surrounded on all sides, except the south-east, by lofty cliffs of conglomerate rock, and having an area of about 15 acres. The entrance is exposed between east-south-east, and south-south-west. Spring tides rise 30 feet, and neaps 25 feet. At ordinary high water, the depth, at the mouth of the harbour, is 18 feet, and at the bridge about a quarter of a mile inside 12 feet. At about two thirds ebb, the mouth of the harbour dries and at low water the beach extends nearly a quarter of a mile outside.

Two breakwaters, the one on the eastern point 185 feet long, and the other, on the western point, 100 feet long, were built by the Provincial Government, but these were totally destroyed by successive storms in 1864 and '65. In 1873, the Department constructed a breakwater 300 feet long, on the eastern point, at a cost of \$18,877.84. In December 1881 a contract was made for the erection of a breakwater of the same length, on the western side of the entrance.

These works will render the harbour a safe place of refuge accessible for coasting vessels of the ordinary size, between four hours flood and two hours ebb tide.

The north shore of the Bay of Fundy, between St. John and Shepody, a distance of about 110 miles, is without a natural harbour in which vessels can seek shelter at low water. Since their improvement by the Department, Black River 12 miles, Quaco 30 miles, and Herring Cove 65 miles from St. John, afford refuge to very small vessels after half flood.

The town of St. Martin's, on the shore of Quaco Bay, is the terminus of the St. Martin's and Upham Railway, a branch of the Intercolonial. Total expenditure by the Department since Confederation, \$20,846.52.

HERRING COVE.

Herring Cove, Albert County, lies on the north shore of Chignecto Bay, the north-eastern arm of the Bay of Fundy. It is about eleven and a-half miles west of Cape Enragé, and about thirty-five miles east of Quaco Light.

The Cove is sheltered on the south-west side by a cliff of sandstone extending 580 feet beyond high water mark. From the end of this cape, a reef runs out 250 feet to low water mark, and at 210 feet further there is a depth of two fathoms at low water. The Cove is dry at low water, and then affords no natural shelter for vessels.

In 1873, the Department built a breakwater 215 feet in length on the reef, and has a small harbour with a depth of from five to ten feet at low water is formed. Spring tides rise thirty-seven feet, and neaps thirty feet. The cost of the work has been \$13,113.45.

Copper ore, some of which is very rich, is found in abundance in the neighbouring district, but has not been much worked of late years.

ROCHER BAY.

Rocher Bay, Albert County, is on the east side of Salisbury, Cove which lies between Cape Enragé and Herring Head, on the north side of Chignecto Channel. In 1879-80, \$3,130 were expended in the construction of a block of cribwood 100 feet in length as part of a proposed breakwater for the protection of vessels.

HILLSBOROUGH.

Hillsborough, Albert County, is situated on the west bank of the River Petitcodiac, about 14 miles below Moncton. The Albert mines, which produce the valuable mineral known as "Albertite," are in the vicinity. Gypsum is abundant and is extensively worked. The Hillsborough mills, which have been in operation since 1861, manufacture large quantities both for agricultural purposes and for plaster. The productive capacity of the mills is about 600 barrels per day. In 1874, the Department constructed a small breakwater, 130 feet in length, at the mouth of the Hillsborough River, to protect vessels from the current of the Petitcodiac. The cost of the work was \$3,000.

STONY CREEK.

Stony Creek is on the west bank of the Petitcodiac River, 8 miles below Moncton. The object of the works at this place was to deflect the current, and to close a channel which had been gullied out between the western shore and a ledge of rock, which lies in the bed of the river, and which was, by the set of the current through the gully, rendered extremely dangerous to vessels, etc. The structure, which is 300 feet in length, was placed under contract in November, 1872, and completed in November of the following year, at a cost of \$12,436. The results have been quite satisfactory.

SACKVILLE.

The town of Sackville, Westmorland County, one of the principal stations on the Intercolonial Railway, is situated on the Tintamarre River and on the western margin of the Great Tintamarre marsh, a body of alluvial soil containing upwards of 25,000 acres, about 5,000 of which are cultivated.

The river is very crooked and at a place called the "Ram Pasture," a short distance below the town, two of the bends approach within one hundred feet of each other. As the water, at spring tides, washed over the intervening neck, it appeared probable that at no distant time, the river would cut through, and thus be diverted quite away from the wharves, which are connected with the railway by a branch line and which would in consequence be rendered useless.

In 1875, \$900 were expended in building a brush breastwork 660 feet in length which in 1880 was raised five feet, lengthened 265 feet, and connected at its western end with the dyke surrounding the "Ram Pasture" by a dyke 600 feet in length. The cost of this was \$750. To complete the protection, a dyke about 1,200 feet long to connect the eastern end with the Au Lac dyke (so called), is requisite.

In 1879, \$400 were expended in removing a number of large boulders and loose stones from a portion of the beach, opposite the wharves, in order to permit vessels to ground without injury during low water, at which time the harbor is dry. Total expenditure by the Department since Confederation, \$2,050.00.

POINTE DU CHENE.

Pointe du Chêne is on the south-east side of the entrance to Shediac Harbour and is the eastern terminus of the New Brunswick Division of the Intercolonial Railway. The Railway Pier is 1,860 feet long, and was formerly exposed to a heavy sea during north-easterly gales, by which it was frequently injured. In 1875 a detached breakwater, 600 feet in length, was built by the Department to protect the pier, at a cost of \$14,583.24.

In 1879-80, owing to representations made by the Harbour master and other interested in the port, that the old ballast wharf was filled up, and that in consequence there was no proper place of deposit for ballast, the Department built a wharf connecting the outer ends of the railway pier and breakwater, against which vessels can lie and discharge their ballast on the inner side. At the same time, the breakwater was strengthened by sheet piling, the cost of the whole being \$6,916.74. During a gale on the 21st October, 1879, the sea rose 7 feet higher than the highest spring tides known, submerging the breakwater and pier from end to end, and stripping off the top from about 1,000 feet of that part of the latter which was unprotected by the breakwater. In 1881 a contract was made for the construction of an extension, shoreward, of the breakwater, 600 feet in length. This work has been completed at a cost of \$15,000, and the pier is now effectually protected.

In June 1875, \$796.94 were expended in dredging the slip at the railway wharf. Total expenditure by the Department since Confederation, \$32,572.37.

COCAGNE.

The Harbour of Cocagne, Kent County, is on the south-west coast of the Strait of Northumberland, about 10 miles north of Shediac. The entrance is obstructed by a bar of sand and gravel, the channel over which is narrow and crooked with a depth of 10 feet at low and 14 feet at high water, ordinary spring tides.

During the past summer \$786.90 have been expended in improving this channel by dredging.

Inside the bar there is anchorage in from $2\frac{1}{2}$ to 4 fathoms water in a narrow basin three-quarters of a mile long.

Further in, the bay, which is a parallelogram $2\frac{1}{2}$ by $3\frac{3}{4}$ miles, is shallow, having from 8 to 10 feet at high and only from 4 to 6 feet at low water. T

Cocagne River enters the south-west angle, and at its mouth there is a pool about half a mile long and between 500 and 600 feet wide, where vessels may lie in from 10 to 14 feet at low water. During 1881-82 the Department has constructed a quay 400 feet long on the northern side of this pool, for the purpose of providing a shipping place for the products of the surrounding country, Expenditure, \$941.76.

BUCTOUCHE.

Buctouche Harbour, Kent County, is situated on the southwest shore of the Straits of Northumberland, 16 miles north of Shediac. During 1881 and 1882, the Department has expended \$4,934.24 in dredging a passage through some large mussel beds which obstructed the navigation, and in widening the channel by the removal of an old wreck.

RICHIBUCTO.

Richibucto Harbour is on the south-west shore of the Gulf of St. Lawrence, about 40 miles north of Shediac. The entrance is obstructed by an extremely dangerous bar of sand, which extends for two miles east-south-east from the north beach and the channel through which is constantly changing.

The works proposed for the improvement of the harbour were the construction of two breakwaters, one, to extend from the southern point of the north beach, is in a south-eastwardly direction for a distance of 1,200 feet, and the other to run out north-eastwardly from the south beach, a distance of 1,500 feet, the object being to confine the outflowing waters into one permanent channel, and to carry them through the bar.

In February, 1873, a contract was made for the construction of 320 feet in length of the north breakwater, and this was, notwithstanding damage by storms to which it was much exposed, completed in September, 1874. In December, 1874, a contract was made for the completion of the structure by the building of the remaining 880 feet, and the work was finished in the following September.

In 1876 it was found that the sea, during easterly storms, ran along the south side of the breakwater and that there was danger of its cutting through the beach at the inner end. It therefore became necessary to carry protective works some distance to the westward. In 1880-81-82, this work was extended as the encroachments of the sea advanced, and a further length of between 300 and 400 feet will still be required to reach the point where the beach curves away northwards and is no longer exposed. The total expenditure for construction and maintenance has been \$38,447.20.

In August, 1873, dredging operations were commenced on the bar and continued during 1874-75-77-78 in which time 47,735 cubic yards of sand had been removed at a cost of \$14,299.59. From 1871 to 1875, while the works for the improvement of the Entrance were in progress, \$13,000 were expended in Tug Service.

MIRAMICHI.

The Miramichi is the second river of the Province in extent and importance. Its branches, which are very numerous, drain a vast extent of wilderness country, and, uniting as they approach the sea, form a stream of considerable magnitude. Some of the southwestern branches approach the St. John and almost touch the Nashwaak, others reach the lands of the Lower Tobique, while three of the north-western branches spring from a chain of lakes not far from the sources of the Tobique and Nipisiguit.

Fifteen miles above the mouth of the river, at Sheldrake Island, or 30 miles above the mouth of the Bay, the two main tributaries, the north-west and south-west, unite. The river is navigable to this point for large vessels, and for small craft some miles further.

In 1876, the Department expended \$2,955.48 in improving the navigation of the south-west river as far as Indiantown, 14 miles above the confluence, by removing a

number of large boulders and cutting through the points of several shoals, thus allowing the passage of small steamers. During 1874-75, \$4,000.00 were expended in maintaining the Tug Service.

HORSE-SHOE SHOAL.

The Horse-Shoe Shoal, which is of great extent, lies at the mouth of Miramichi Bay and is composed of sand and gravel. The work of making a channel through it 150 feet wide and 20 feet deep, was commenced in August, 1876, and has been continued since, the expenditure up to 30th June last, amounting to \$42,293.23.

SHIPPEGAN.

Shippegan Harbour, Gloucester County, is at the southern extremity of Shippegan Sound, an arm of the Baie des Chaleurs, with which it is united by Shippegan Channel. At the southern end the harbour is connected with the Gulf of St. Lawrence by Shippegan Gully. Vessels drawing 14 feet can reach the harbour by the northern entrance, but the gully is used only by shallops and fishing boats. If the latter could be deepened sufficiently to permit the passage of steamers bound from the ports in the Straits of Northumberland to those in the Baie des Chaleurs, from 20 to 25 miles of rough water would be avoided. Before the construction of the Intercolonial Railway, this was a matter of more general interest than it is at present.

In October, 1875, a contract was made for the building of a Breakwater, 1,750 feet long, to protect the southern entrance of the gully, and a Dam, 870 feet long, to close an opening known as the "East Gully." Owing to the failure of the contractor the works were suspended at the close of the summer of 1876, and re-let, in December 1877. Operations were resumed in April, 1878, but about the end of July, the second contractor stated his inability to proceed any further and the work was taken off his hands by the Department. At this time the Dam was completed, about 900 feet of the Breakwater raised to its proper height, and about 500 feet partly built. On 21st October, 1879, a storm occurred, during which the tide rose 4 feet higher than before known, and 2 feet above the top of the dam, injuring that structure considerably while the outer 500 feet of the breakwater, which had been left unfinished, was completely demolished, and the remainder much damaged.

In 1880 and 1881, the dam was repaired, raised 2 feet, and strengthened by pile driven 10 feet apart on each side, and waled and capped.

The total expenditure has been \$22,084.97.

GRAND ANSE.

Grand Anse, Gloucester County, is a small inlet on the south shore of the Baie des Chaleurs, about midway between Bathurst and Shippegan.

In the fall of 1875, a breakwater, 200 feet in length, was begun, and the work of it continued from time to time until its completion in 1879. The cost of the structure, including a small amount for repairs, has been \$7,156.28. It is said to have been of much benefit to the neighbourhood.

CLIFTON.

Clifton, Gloucester County, is situated on the southern shore of the Baie des Chaleurs, about 19 miles eastward of the entrance to Bathurst Harbour.

A breakwater was built some time ago by private parties, who, in 1878, transferred their title to the Crown. In the same year a contract was made by the Department for the construction of an additional length with a spur at the end, with the view of enclosing and protecting a small area wherein vessels can find shelter. The cost of the works, including maintenance and repairs, has been \$9,681.75.

BATHURST.

Bathurst, the shiretown of Gloucester County, is situated at the head of Nipisiquit Bay, the south-western arm of the Baie des Chaleurs. The harbour basin is large and well sheltered, but, with the exception of a narrow channel in the middle and the beds of some streams which empty into it, it is all dry at low water. A depth of 14 feet can be carried up to the wharves of the town at high water, and there are several places where vessels may lie in 14 feet, at low water. The principal obstructions to the navigation are the Ballast, Seal, Inner and Outer Bars, and, during 1875, 1876, 1878, 1879, 1881, the Department expended \$24,505.25 in deepening the water over these by dredging.

Spring tides rise 7 feet, and neaps 4 feet.

 PROVINCE OF PRINCE EDWARD ISLAND.

NORTH COAST—NORTH POINT TO EAST POINT.

The harbours on the north coast of Prince Edward Island are all of the same character, being obstructed by bars of shifting sand lying at various distances outside their mouths. With the exception of Malpeque, they are navigable for only small vessels, and are practically inaccessible during storms when there is a heavy sea running, as the breakers then extend quite across, leaving no visible channel.

These bars form a great impediment to the successful prosecution of the shore fisheries. The boats, when fishing in the offing, are obliged to run for the harbour on the approach of a storm much sooner than they would were the navigation clear, in order to get across the bar before the sea begins to break on it. After the wind subsides they are prevented from leaving the harbour until the sea on the bar has gone down. In this way it is estimated that one-third of their time, and frequently the best of the fishing, is lost.

Most of the works on this coast have therefore been designed for the purpose of deepening the water on the bars and maintaining permanent channels.

TIGNISH.

Tignish Harbour is situated at the mouth of Tignish "Run," about eight miles east of North Point. It is only a boat harbour of limited area, but its improvement has given a great impetus to the fisheries in the vicinity.

The works were begun by the Provincial Government in 1868, and up to 1873, when the Island entered into Confederation, the amount expended was \$8,149.56. Since then the Department has expended in repairs and extensions \$19,754.53.

The works now consist of two breakwaters—the northern 850 feet, and the southern 300 feet, in length—and of 1,350 feet of breastwork of piles, brush and stone; 800 feet of sheet piling, and about 500 feet of groynes. The result has been all that was expected. Prior to 1869 there was only one foot of water at the mouth of the "Run," and only such small boats as could be drawn up on the beach were used. Since the breakwaters were completed, the depth, which depends to some extent on the prevalence or otherwise of north-easterly winds, has never been less than five feet, and is generally more. Large two-masted boats are now employed. The fishing grounds on both sides of North Point are good, and much frequented by fishermen from Caraquet, N.B., as well as by those belonging to the Island, and many of these seek refuge at Tignish during storms.

Spring tides rise 3 feet and neaps 2 feet.

MALPEQUE.

Malpeque Harbour lies at the mouth of Richmond Bay. It is pronounced by Admiral Bayfield to be "superior to any other on the northern coast of the Island,

having 16 feet over its bar at low water and from 18 to 19 at high water, ordinary spring tides, together with depth and space enough inside for any description and number of vessels."

A breakwater, 600 feet long, has been built by the Department on the "Royalty Sands," on the eastern side of the harbour to shelter the anchorage from north-east winds which throw in a heavy sea through the eastern channel, and to afford a shipping place for the produce of the surrounding country. The cost of this work has been \$15,278 53.

NEW LONDON.

The harbour of New London, or Grenville Bay, is about twelve miles east of Malpeque. Prior to Confederation the Provincial Government had expended \$4,075.60 and since then the Department has expended \$8,841.42 in the improvement of the entrance.

The work consists at present of a breakwater, 1,300 feet long, constructed partly of piling and brushwork and partly of cribwork. It stands on the beach at the eastern side of the harbour and is intended to confine the ebb current and direct it on to the bar as well as to prevent the sea from washing sand into the channel. The result of the construction of this work has been very satisfactory, the depth of water on the bar having increased from 6 feet to 14 feet, in a channel 450 feet wide and this harbour is now one of the best on the coast having more water over its bar than any other except Malpeque.

Within the entrance the bay is three miles wide and receives the waters of the South-west and Stanley Rivers, both of which are navigable by vessels drawing not more than 10 feet of water, for a distance of five or six miles.

Besides being a convenient locality for fishing, New London is the shipping point for the produce of a large and fertile farming district.

A further expenditure of about \$5,000 is required to complete the design for its improvement.

GRAND RUSTICO.

Rustico, one of the principal fishing stations on this coast is nearly equidistant from the North and East Points. The harbour is of good size, and well sheltered, but the entrance is rendered difficult by a bar of sand overlying clay, the channel through which shifts frequently, and on which the depth of water is generally not more than six or seven feet at low water, and sometimes even less after a long duration of north-easterly winds.

The bay inside Robinson's Island is about five miles long by half a mile wide and there is another narrow entrance two miles east of the harbour.

The Provincial Government has expended small sums from time to time amounting, in the aggregate, to \$2,616.70 in protecting the beaches.

A contract was made in December, 1881, by the Department for the construction of a breakwater 1,200 feet long on the west side, and one 450 feet long on the east side of the entrance, the object being to concentrate the ebb current upon the bar for the purpose of maintaining, if possible, a constant depth of ten feet at low water, which is said to be sufficient for the present demands of the port. Should any greater depth be found requisite hereafter, the presence of clay will render dredging necessary. Total expenditure by the Department, \$4,549.60.

ST. PETER'S.

St. Peter's Harbour, generally called St. Peter's Bay, is of great extent, running in eight miles, with an average width of three-quarters of a mile, and having a depth of from two to three fathoms, but there being only from five to six feet at low water over the bar at its mouth, with a rise of tide of from two to four feet, none but small vessels can enter. In 1868 a breakwater of brush and stone, 600 feet long, built

he Provincial Government, stood on the eastern side of the entrance. This has now nearly disappeared, being partly destroyed by storms and buried in the accumulated sand, but it has to some extent been useful in preventing the sea from washing away the point.

The Department has expended \$6,387.84 in constructing a pier 226 feet long on the western side, to afford shelter to fishing boats, and a breastwork 80 feet long to preserve the beach from the encroachments of the sea.

CAMPBELL'S COVE.

Campbell's Cove, about nine miles from East Point, is an indentation in the coast, open from north-west to east-south-east, or over an arc of nearly 160°. In 1872, the Provincial Government built a detached breakwater, 300 feet long, on a reef which extends from the west point of the Cove, at a cost of \$4,530. The Department has since repaired this structure, raised it two feet, connected it with the shore, and built an extension of 250 feet, with an expenditure of \$7,421.42.

The coast from St. Peter's Bay to East Point, a distance of 36 miles, is an unbroken range of sandstone cliffs, with a few sandy beaches at the mouths of small streams where boats can land only in fine weather. The formation of a harbour at Campbell's Cove will therefore be of great benefit to the fishing and farming industries of that neighbourhood.

Spring tides rise $3\frac{1}{2}$ feet, and neaps 2 feet.

EAST COAST—EAST POINT TO CAPE BEAR.

COLVILLE BAY.

Colville Bay is about 16 miles from East Point. It is rather more than a mile in width between Knight's and Lobster Points and half a mile in transverse depth. The anchorage is good and safe with all northerly winds, and in order to afford shelter from southerly winds the Dominion Government has built a breakwater, 160 feet long, on the east side of the bay, at a cost for construction and repairs up to June last, of \$100,436.81. The breakwater stands in 22 feet water for a great part of its length, and is exposed to a very heavy sea during southerly storms.

The Souris River falls into the west side of Colville Bay, and up to 1873 the Provincial Government had expended \$9,251.42 in building a breastwork of brush and stone, nearly a mile long, at the mouth, for the purpose of forming a harbour for small vessels. This work is now much out of repair.

Colville Bay is the principal shipping place for the eastern end of the Island, and the eastern terminus of the railway.

GRAND RIVER.

Grand River, seven miles from Colville Bay, would be a fine harbour were it not for its shallow bar and the intricate nature of the channel at its mouth. It is about three miles long, one mile wide, and has a depth of from 3 to 5 fathoms.

There are settlements on both sides of the river, which can be ascended by boats as far as the bridge, a distance of seven miles from its mouth.

The bar, which lies about a mile outside, had only 6 feet on it at low water, and about half a mile inside of Bank's Point, the channel, though it has a low water depth of from 10 to 16 feet, was narrow and crooked.

The sum of \$8,963.97 has been expended in 1878-79, in improving the entrance by dredging the bar and channel.

Spring tides rise $4\frac{1}{2}$ feet, and neaps $2\frac{1}{2}$ feet.

MONTAGUE.

Montague River falls into Georgetown Harbour from the west. During 1877 and 1878, the Department expended \$17,119.49 in improving the channel by dredging. Vessels of a considerable size can now ascend the river for a distance of 5 miles above Georgetown, or as far as the bridge where the produce of a large and fertile tract of country is annually shipped.

SOUTH RIVER.

South River falls into Murray Harbour, about 2 miles within the entrance. It is navigable, at ordinary high water, for vessels of 30 or 40 tons burthen, for about a mile above its mouth; but the channel being narrow and very crooked, it is proposed to straighten it to some extent, by dredging, and up to the end of June last \$1,070.59 had been expended for that purpose. This is the most convenient place of shipment for the district lying south of Murray River.

Spring tides rise $6\frac{1}{4}$ feet, and neaps $3\frac{1}{4}$ feet.

Murray Harbour bar has a depth of 10 feet over it at low water.

SOUTH COAST,—CAPE BEAR TO WERT POINT.

WOOD ISLANDS.

Wood Islands, about 15 miles west of Cape Bear, are two small islets, about 5 feet high, connected by a sand beach, their total length being 4,200 feet. They lie parallel to the shore, from which they are distant about half a mile. The western point is connected with the main land by a sand bar, and a spit of sand runs out from the shore to within about 300 feet of the western end of the eastern islet. A pond with an area of about 300 acres is thus enclosed, having an outlet at its south-eastern corner.

The pond itself is too shallow to serve even as a boat harbour, and an attempt has been made to form a shelter for boats and small coasting vessels on the inside of the eastern island by extending a pier eastwardly from the end of the sand spit and parallel to the shore, with the expectation that the scour caused by the tidal outflow from the pond would keep clear of sand a channel having 10 feet at high water, a greater depth being unattainable without dredging, as tough blue clay underlies the sand.

The Provincial Government began this work in 1859, and has extended it from time to time to a length of between 2,400 and 2,500 feet. It is constructed partly of brush and partly of cribwork, and has never been properly finished. No expenditure has been made on it by the Department.

A breakwater 500 feet long has been built on the eastern point of the Islands by the Department, at a cost of \$5,324.93, and the sum of \$548 spent in dredging the channel.

PINETTE HARBOUR.

Pinette Harbour, four miles east of Point Prim and 12 miles west of Wood Island, is fit only for small vessels, having but 10 feet over its rocky bar at high water spring tides. The channel inside carries from three to four fathoms for $2\frac{1}{2}$ miles to the shipping place.

The sum of \$756.24 has been expended by the Department in straightening the channel near the wharf by dredging.

VERNON RIVER.

Vernon River falls into Orwell Bay, 18 miles east of Charlottetown. Inside China Point, at the confluence of the Orwell and Vernon Rivers, there is good anchorage.

age where vessels may lie land-locked in a channel 500 feet wide, and carrying five fathoms water.

Vessels can ascend the Vernon River for more than a mile at low water and as far as the bridge, 3 miles above China Point, at high water. The channel for about a mile below the bridge is obstructed by oyster beds, and \$6,326.72 has been expended by the Department in improving it by dredging.

POWNAI.

Pownal Bay is shoal, and open to westerly winds, but the country about it being fertile and thickly settled, it is the shipping place for a large quantity of farm produce. The Department has expended \$11,765.85 in deepening a channel to the wharf near the head of the bay.

CHARLOTTETOWN.

Charlottetown Harbour is about half a mile wide at its entrance, but shallow water extending from both sides reduces the navigable channel to little more than half that width; within the entrance the channel expands, forming a harbour with space and depth enough for vessels of the largest class. Three rivers, the Hillsboro' or East River, the York or North River, and the Elliott or West River, unite in the harbour.

Of these the Hillsboro' is the largest, being navigable for vessels of great draught for seven or eight miles, and for small vessels as far as Mount Stewart, sixteen miles above Charlottetown. In some places the channel is obstructed by old oyster beds. The Department has expended \$3,223.47 in removing some of these, and in deepening the water at "Hickey's Wharf."

York River, the smallest of the three, is crossed by a bridge at Poplar Island, three miles from its mouth.

Elliott River may be ascended four or five miles by large vessels, and about ten by small vessels.

In Charlottetown Harbour the Department expended during 1875 and 1876 the sum of \$10,264.56 in deepening the water at the railway wharf, and, in 1878, \$3,096.29 in work of a similar description at the Rocky Point Ferry landing on the south bank of the Elliott River.

Spring tides rise 10 feet, and neaps 7 feet.

NINE MILE CREEK.

Nine Mile Creek, five miles west of the Blockhouse Light at the entrance of Charlottetown Harbour, is a shallow inlet opening into the passage between St. Peter's Island and the main land. It is accessible for only small vessels. A channel has been dredged to the wharf at a cost of \$6,286.46.

CRAPAUD.

Crapaud is a small but secure anchorage at the mouth of the Brockelsby River, fifteen miles west of St. Peter's Island. The Department has expended \$19,151.46 in improving the entrance by dredging.

WEST COAST,—WEST POINT TO NORTH POINT.

MIMINEGASH.

North or Big Miminegash is twenty miles from West Point and eighteen miles from North Point.

There are no natural harbours on this coast, for though South Miminegash, Skinner's Pond and Nail Pond afford shelter for boats, their outlets are nearly dry at low water.

North Miminegash, before its improvement, was of the same character, but it has some advantage over the others, inasmuch as it is a good deal sheltered by Miminegash Reef, a ledge of rock nearly a mile long, which lies parallel to the shore at the distance of about half a mile. The reef is nearly dry at low water, but there is a channel with $2\frac{1}{2}$ fathoms between it and the shore.

The pond inside the sand beaches is of sufficient size to furnish a considerable quantity of scour in the channel during ebb tide.

The works at this place consist of two piers, the northern 470 feet long, and the southern, 150 feet long. The expenditure, up to the 30th of June, amounted to \$6,466.57.

A number of large boats are engaged in the mackerel fishery, and the improvements have given much satisfaction, as the fishermen can now enter or leave the harbour in safety at all times of tide.

Tides rise from 2 to 3 feet.

PROVINCE OF QUEBEC.

HOUSE HARBOUR.

House Harbour is in the Magdalen Islands, Gulf of St. Lawrence.

The Government Dredge "Canada" was engaged from the 19th July to the 15th August, 1873, in removing 680 tons of coarse gravel, at a cost of \$2,291.60.

Total expenditure since Confederation, \$2,291.60.

ETANG DU NORD.

Etang du Nord is situated at the western extremity of Grindstone Island, one of the Magdalen group, in the Gulf of St. Lawrence.

In 1881 the construction of a breakwater, from 750 to 800 feet in length, was commenced, and during the fiscal year a length of 225 feet was completed. It is intended to form a harbor of refuge for the numerous fishing craft frequenting the islands. The depth of water in the inside harbor varies from 10 to 14 feet during extreme low water,

Neap tides rise $1\frac{1}{2}$ feet; springs rise 3 feet.

Total expenditure since Confederation, \$12,912.63.

AMHERST HARBOUR.

Amherst Island is one of the most important of the Magdalen group, and is situated in the Gulf of the St. Lawrence, about 140 miles south-east of Percé.

The harbour is capable of accommodating from 200 to 300 vessels, and is much frequented by fishing craft. It has a depth of from 15 to 20 feet. On 1st January, 1865, the harbour was placed under the control of the Trinity House, Quebec, and prior to Confederation the sum of \$400 was expended for placing and removing buoys.

In 1870 it was decided to improve the entrance to the harbour, which was crooked and had a width of only 30 to 50 feet, with a depth of from 5 to 7 feet at low water. Operations were commenced in 1871 and continued until 1874, the entrance being straightened, and the width increased to 150 feet by a depth of 9 to 10 feet at low water. The material removed from the bar was almost all rock.

Tides rise 2 to 3 feet.

Total expenditure since Confederation, \$14,283.21.

GASPE BAY AND HARBOUR.

Situated at the eastern extremity of the Peninsula of Gaspé. The buoys in the bay and harbour were placed under control of the Quebec Trinity House by Order in Council, 8th August, 1864, prior to which time \$787.11 had been spent by the Provincial Government in placing them.

No expenditure has been made since Confederation.

NEW CARLISLE.

New Carlisle is the *chef lieu* of the County of Bonaventure, and is on the north shore of the Baie des Chaleurs, 65 miles from Campbellton, N.B., with which place here is semi-weekly communication during the season of navigation by the steamer plying between Campbellton and Gaspé in connection with the Intercolonial Railway.

A pier was commenced here, in 1881, on a site donated by Lieut.-Governor Robitaille, and the municipality also promised to donate \$2,500. Owing to the exposed position of the pier, only 180 feet of the work to the level of high water was put in place during the working season, leaving a length of 320 feet still to be constructed to connect with the shore, together with the superstructure over the whole length. Depth of water at the outer end of the pier varies from 13 to 14 feet during low water of spring tides.

Neap tides rise 3.5 feet; springs rise 6.5 feet.

Total cost since Confederation, \$4,220.20.

CARLETON.

Carleton is situated in the County of Bonaventure, on the north shore of the Baie des Chaleurs, thirty-six miles below Campbellton, N.B.

During the seasons of 1881-82, the construction of a landing pier was commenced for the accommodation of the steamer plying between Campbellton and Gaspé Basin in connection with the Intercolonial; and at the close of the fiscal year the work was nearly completed.

The pier is built of crib work filled with stone, and is 25 feet in length, by 28 feet wide, with a head 90 x 20 feet. Depth of water at end of pier, at extreme low water, 10½ feet.

Neap tides rise 3.5 feet, springs rise 6.5 feet.

The Municipality of Carleton contributed \$2,500 towards building the pier.

Total expenditure since Confederation, \$4,665.31.

CAP CHATTE HARBOUR.

The Cap Chatte River is on the Gaspé coast of the River St. Lawrence, about two and a-half miles to the north-east of the Cape from which it takes its name.

The entrance to the river was obstructed by a bar of sand and gravel which was dredged, in 1871-72, to a depth of feet at low water so as to admit small vessels.

Neap tides rise 5 feet; spring tides 8 feet.

Total expenditure by the Department since Confederation \$792.20.

MATANE.

The village of Matane is in the County of Rimouski, on the south shore of the St. Lawrence, 240 miles below Quebec, and distant thirty miles, by way of Little Metis, from St. Octave, the nearest point on the Intercolonial Railway.

In 1879 the sum of \$10,000 was placed in the estimates for the construction of a landing pier, which would be dry at low water, and have 20 feet at its outer end at high water, ordinary spring tides. The amount was expended by a syndicate appointed by the village, by day's labour, under the supervision of the Department.

The pier consists of ten cribs, placed 25 feet apart. The lengths of the cribs are: one of 60 feet, four of 30 feet and five of 15 feet, making a total of 480 feet. The blocks are 30 feet wide. The spaces between the cribs were protected, during the summer of 1882, with rows of close piling, which have had the desired effect of accumulating the sand on the upper side which formerly passed through the openings, filling the channel. The pier is dry at low water; but has 6 feet at its outer end at one-third flood, and 15.5 feet at high water.

Neap tides rise 6.7 feet; springs rise 14 feet.

Total expenditure since Confederation, \$11,271.43.

RIVER BLANCHE.

The River Blanche flows through the County of Rimouski, and empties into the St. Lawrence on its southern shore, about twenty-six miles east of the River Métis and nine miles from Matane.

In 1875-76 a mooring pier 70x30 at the base and battering to 60x24 at the top with a total height of 18 feet from base to summit, was built here. The level of the pier having been found to be too low and its dimensions somewhat limited, an addition of sixty feet was made at the eastern end in 1879, and the whole structure raised three courses and a slip built on the south or shore side. This pier is about 550 feet from the shore, and could easily be connected with it by crib work so as to afford an excellent landing place accessible at high tide to vessels engaged in the coasting trade.

Neap tides rise 6.7 feet; spring rise 14 feet.

Total expenditure since Confederation \$5,101.73.

[RIMOUSKI.

The village of Rimouski is the *chef lieu* of the County of the same name, and is situated on the south shore of the St. Lawrence, 179 miles below Quebec. It is an important station on the Intercolonial, fifty-four and a-half miles below River du Loup and the point at which the Allan steamers land and receive mails and passengers during the summer.

In 1855 a pier was completed, about one mile below the village, at a cost of \$106,944.80.

Total expenditure for repairs since Confederation, \$2,616.00

TROIS PISTOLES.

Trois Pistoles is in the County of Témiscouata, on the south shore of the St. Lawrence, about 148 miles below Quebec.

At the Session of Parliament in 1881, the sum of \$3,500 was voted for the erection of a landing pier; and during the year a block, 50 feet by 30 feet, was constructed off the western side of the harbour, and many boulders were removed from the harbour proper. The work of connecting the block with the shore was to be continued so as to make it available as a landing.

Neap tides rises 11 feet; spring rise 17 feet.

Total expenditure since Confederation, \$3,500.

RIVER DU LOUP (EN BAS).

The village of River du Loup is the *chef lieu* of the County of Témiscouata, and is situated on the south shore of the St. Lawrence, 114 miles below Quebec.

The pier is at the extremity of a point of land about one mile distant from the village, and is built of wood and stone. It is 1,641 feet in length, and its breadth 30 feet excepting the last 50 feet, which is 124 feet wide. At the outer extremity the pier is 42 feet above the bottom of the river, and the depth of water at extreme

low tide was 16 feet at the time the pier was built. It was completed in 1855 at a cost of \$170,129.35.

In 1879 the work of repairing the pier was commenced and was carried on during the three following years. It having been found that the inner end of the pier was too low, and that heavy seas sometimes broke over it and washed out the gravel roadway, the level of the pier was raised 3 feet and the roadway planked over. A berth for vessels on the western side of the pier was dredged to a depth of 16 feet at low water.

Neap tides rise 12 feet; spring rise 18 feet.

Total expenditure since Confederation, \$16,104.19.

ESCOUMAINS.

Escoumains Harbour is situated on the north shore of the River St. Lawrence, about 25 miles below Tadoussac, in the County of Saguenay. Boulders, obstructing the access to the wharves, were removed at a cost of \$1,189.80. This work was performed in 1881.

Total expenditure since Confederation, \$1,189.80.

TADOUSSAC.

Is the *chef lieu* of the County of Saguenay, and is on the east side of the River Saguenay, about 122 miles below Quebec.

A fish breeding establishment is in operation here under the control of the Department of Marine and Fisheries; and up the 1st July, 1882, the sum of \$4,046.46 was expended in reconstructing the three dams previously constructed, and in building a fourth dam at a lower level near the public road of l'Anse à l'eau.

Neap tides rise 10 feet; springs rise 17 feet.

Total expenditure since Confederation, \$4,046.46.

ANSE DU PORTAGE.

Anse du Portage is situated at the mouth of the River Saguenay, opposite Tadoussac.

At the Session of Parliament, 1881, an appropriation was made for the construction of a landing for the purpose of facilitating the transportation of the mails during the winter across the Saguenay to and from Tadoussac, and work was prosecuted during the years 1881-82.

This landing, when complete, will consist of an incline plane 90 feet in length, at the head of which, on a platform 14 feet long, will be placed a windlass, by the means of which the mail boat can be drawn up and placed in safety. To prevent the accumulation of ice on the slip when the wind is from the north-east and east, a jetty 108 feet in length has been constructed on the eastern side. At the close of the fiscal year the works were well under way, and would be completed in time for service during the winter of 1882-83.

The depth of water at the end of the landing pier is 4 feet during extreme low water, and 21 feet during ordinary high water of spring tides.

Ordinary neap tides rise 10 feet, spring tides 17 feet.

Total expenditure since Confederation, \$584.43.

ANSE ST. JEAN.

Anse St. Jean is situated on the south-western shore of the River Saguenay, twenty-five miles from its mouth. The work here consists of a landing pier 366 feet in length, having a depth of seven and a half feet at low water at its outer end. The work was commenced by the Local Government in 1876, and continued by the Dominion Government in 1879-80, 1880-81 and 1881-82. Further work, required to complete the pier, will be proceeded with during 1882-83.

Neap tides rise 12 feet, ordinary spring tides 17 feet.

Total expenditure since Confederation, \$4,752.63 by Dominion Government, and \$1,700 by Local Government and Municipality, etc.

BAGOTVILLE.

St. Alphonse de Bagotville, is at the head of the Ha! Ha! Bay, on the north-west shore of the River Saguenay, 66 miles from its mouth.

A landing pier was built here, prior to Confederation, by the parochial authorities, at a cost of about \$3,200. In 1876, an arm was built, by the Department, on the south side of this pier, 55 feet long by 26 feet wide, at a cost of \$3,084.34. In 1881, the pier was strengthened and repaired at a cost of \$3,897.70. Some years ago a part of the inshore portion of the pier was burnt to the water's edge. During the year 1881-82, a length of 378 feet was re-constructed to a mean height of 10 feet, a large portion of the flooring renewed, and other repairs made. A sum of \$3,500 has been granted for the construction of a block at the outer end of the pier.

Depth of water at the end of pier, 20 feet, at extreme low water, which depth will be increased to 29 feet, when the proposed block is built.

Ordinary neap tides rise 11 feet; spring tides 18 feet.

Total expenditure since Confederation, \$9,186.63.

RIVER SAGUENAY.

The River Saguenay is one of the main tributaries of the St. Lawrence, into which it flows at Tadoussac, 122 miles below Quebec.

The channel of the river near the village of Chicoutimi has been greatly obstructed by loose rock and boulders, and during the seasons of 1880, 1881 and 1882 operations have been carried on to remove these obstructions and improve the channel to the harbour. The channel is being deepened to a depth of 10 feet during extreme low water, for an extent of three and one-half miles, and a width varying from 150 to 200 feet. About three-quarters of a mile remained to be completed at end of fiscal year.

Neap tides rise 10 feet; spring's rise 16 feet.

Total expenditure since Confederation, \$13,559.94.

CHICOUTIMI.

The town of Chicoutimi is situated on the southern side of the Saguenay River seventy-one and a-half miles from Tadoussac, and at the head of navigation.

A landing pier was erected here in 1874-75, at a cost of \$14,193.40; and, in 1881 the head of the pier was strengthened on its up stream side by the construction of a block 40 feet in length, at a cost of \$1,999.91. Extensive repairs were made in 1881-82.

Depth of water at end of pier 7 feet during extreme low water.

Ordinary neap tides rise 8 feet, spring tides 12 feet.

Total expenditure since Confederation, \$17,017.61.

LAKE ST. JOHN.

Lake St. John is a large body of water, over 85 miles in circumference, about 11 miles on an air line north of Quebec. Its greatest length is about 30 miles, and at least width 18 miles, and it covers an area of about 365½ square miles. Its depth about 3 feet, at 1 mile from the shore, increasing to depths of 12 to 54 feet, half a mile further out. It is surrounded by a fine agricultural country, and eight large rivers flow into it. Its discharge is into the River Saguenay, through two outlets known as La Grande Décharge, and Petite Décharge. As the discharge of these outlets is comparatively small, and less than the inflow of the rivers emptying into the lake, it follows

that during spring freshets, the waters of the lake rise from 15 to 20 feet, and have been known to rise as much as 30 to 35 feet, flooding the surrounding country. Owing to the limited size of La Grande Décharge and La Petite Décharge, the waters of the lake subside slowly, and the submerged lands usually dry out too late for agricultural purposes.

The work of widening the Grande Décharge at one or two points has been undertaken, with the view of increasing its area, and thus permitting a greater flow of water during the continuance of freshets, and a quicker subsidence of the lake.

Total expenditure since Confederation, \$6,303.16.

RIVER OUELLE.

The village of River Ouelle is situated on the river of that name, in the County of Karmouraska, seventy-five miles below Quebec.

The pier is on the south shore of the St. Lawrence, four and one-half miles below the village. It is built of wood and stone, and its total length is 1219 feet by a width of 28 feet. The block at the outer end is 237½ feet in length by a width of 51 feet, and the top of the pier is 42 feet above the bottom of the river. At low water, spring tides, there is 14 feet depth at the outer end. It was completed in 1855 at a cost of \$225,229.87. In 1875 a lighthouse was erected on this pier by the Department of Marine and Fisheries.

Since Confederation the gravel roadway along the top of the pier has been frequently washed out by heavy seas breaking over the pier; and, in 1879, the entire roadway was planked over at a cost of \$12,271.25.

The level of the pier, especially at the shore end, is rather low; and in case of a storm during high water spring tides the waves dash over the piers rendering access to the outer end dangerous, and at times impossible. In 1881 the work of raising the level of the pier was commenced, and was in progress at the close of the fiscal year, 30th June, 1882.

Neap tides rise 12 feet; spring's rise 18 feet.

Total expenditure since Confederation, \$12,848.53.

CAP À L'AIGLE.

Cap à l'Aigle is situated on the north shore of the St. Lawrence, three miles from Murray Bay, in the County of Charlevoix.

During the seasons of 1881-82, a landing pier 160 feet long by 35 wide, and having 18 feet depth at its outer end at low water, was built by the Department.

Neap tides rise 12 feet, springs rise 19 feet.

Total expenditure since Confederation, \$2,946.25.

MALBAIE (OR MURRAY BAY.)

Murray Bay is the best known and most frequented watering place on the St. Lawrence, and is situated on the north shore, in the County of Charlevoix, eighty-three and one-half miles below Quebec. The steamers of the Saguenay Navigation Company call here daily, except Monday, both ascending and descending, and quite a heavy traffic is done.

In 1855 a pier was built on a point of land at the entrance of the bay, called Pointe au Pic, distant about two miles from the village church. It was 470 feet in length by 30½ wide, with the exception of the block at the outer end which was 108 feet wide. The depth of water into the outer end of the pier was 18 feet at low tide, and the total cost up to Confederation, \$53,487.20.

In 1875 an addition of 30 feet was made to the block, which then reached 19 feet of water at low water, ordinary spring tides.

Neap tides rise 12 feet; springs rise 18 feet.

Total expenditure since Confederation, \$17,937.04.

EBOULEMENTS.

The village of Eboulements is on the north shore of the St. Lawrence, 69 miles below Quebec, in the County of Charlevoix.

A landing pier 920 feet long by 30½ wide, and having 15 feet depth of water at its outer end at extreme low water, or 17½ feet ordinary springs, was built about 3 miles from the village, in 1853, at a cost of \$65,531.52.

In 1875 a wing 50 feet long by 41 feet 6 inches wide was added to the eastward side of the head; and necessary repairs have, from time to time, been made.

Neap tides rise 10 feet; springs rise 18 feet.

Total expenditure since Confederation, \$15,450.31.

BAIE ST. PAUL.

Baie St. Paul is on the north shore of the St. Lawrence, between Cape aux Corbeaux and Cape Labaie, about sixty miles below Quebec.

In 1874-75, a pier was built on the westerly side of the bay, between the River du Gouffre and L'Anse à Charpentier. The pier is 200 feet long by 30 feet wide, with a head 60 feet long and 50 feet wide, and is about 3,900 feet from high water mark, spring tides, and 600 feet from low water mark, neap tide. The depth of water at end of pier is 12 feet at low tide. The pier is not connected with the shore, and was built for the purpose of putting a lighthouse on it, and for the accommodation of light-ships when they are being taken to or brought from their moorings in the St. Lawrence.

During the winter of 1881-82, a large quantity of timber was procured for a landing pier at Pointe Rouge, Cap aux Corbeaux, and its construction was commenced in May, 1882. The new pier will be 850 feet long, by 30 feet wide, with a depth of 12 feet at its outer end at lowest spring tides.

Neap tides rise 12 feet, spring tides 19 feet.

Total expenditure since Confederation, \$30,982.73.

ILE AUX COUDRES.

Ile aux Coudres is an island in the St. Lawrence, about twelve miles from Baie St. Paul.

In November, 1880, a contract was entered into with a number of the inhabitants representing the municipality, which had voted a sum of \$4,000 for the construction of a landing pier, and the work was completed in 1881. The pier is 263 feet long by 32 feet wide, and has 16 feet of water at its outer end at low tide.

Neap tide rise 9 feet; springs rise 18 feet.

Total expenditure since Confederation, \$3,718.00

ST. JEAN PORT JOLI.

St. Jean Port Joli is in the County of L'Islet, fifty-five and three-quarter miles below Quebec, on the south shore of the St. Lawrence.

This pier was originally built by the syndics of the village, at an expenditure of \$2,000. In 1818, the Government granted the sum of \$2,000, on condition of a like sum being expended by the syndics. The portion of the pier built by the syndics was considered so insecure that it had to be strengthened, and partially reconstructed.

The pier is 332 feet long, with a width of 40 feet for a distance of sixty feet at the outer end, and of 20 feet for the remainder of its length. It is dry at low water but has eight and a-half feet at its outer end at half tide.

Neap tides rise 11 feet; springs rise 17 feet.

Total expenditure since Confederation, \$3,627.82.

L'ISLET.

The village of L'Islet, in the County of the same name, is situated on the south shore of the St. Lawrence, 46½ miles below Quebec.

A landing pier was built here, in 1855, at a cost of \$113,343.27. The pier is 1,104 feet long by 31 feet wide, with the exception of the last 50 feet, where the width is increased to 118 feet. The outer end of the pier is 34 feet high, and at the time of completion it had $8\frac{1}{2}$ feet depth of water, at extreme low tide, but some filling up has taken place, and now there is not more than $7\frac{1}{2}$ feet.

In 1876 the restoration of the pier was commenced, and completed in 1879, the amount expended being \$21,613.36. The superstructure, to the extent of six or seven courses, was generally replaced with new face timbers and cross ties, and thoroughly filled with stone where required. The level of the shore end, which was lower than the head, and over which heavy seas would break, rendering it dangerous, was raised, the roadway planked from end to end, and the slips put in good order.

Neap tides rise 10 feet, springs rise 18 feet.

Total expenditure since Confederation, \$25,925.69.

ILE AUX GRUES.

Ile aux Grues, or Crane Island, is situated in the St. Lawrence, opposite Cap St. Ignace, thirty miles below Quebec.

In 1862 a block and lighthouse were erected here at a cost of \$10,334.42, near the upper end of the island. This block has been used as a landing for passengers and freight at times of high water, access being had from the main land during the period of low water. To enable vessels to call and land goods, etc., at low water, a contract was entered into in November, 1881, for the construction of a pier projecting 171 feet from the block into 6 feet depth of water at low tide. At the close of the fiscal year the work was about one-third completed.

Neap tides rise 10 feet; springs rise 18 feet.

Total expenditure since Confederation, \$2,636.18.

GROSSE ILE.

Grosse Ile is an Island in the St. Lawrence, thirty-three miles below Quebec and about midway of the river, which is about nine miles wide.

A quarantine station was established here in 1832, and extensive buildings have been erected. In 1848 a pier 345 feet long by 48 wide was built at the south-western extremity of the island. In 1866 a small pier 120 feet in length by 23 feet in width was erected at the eastern end of the island for the special accommodation of the sick. The cost of these two piers up to the time of Confederation was \$17,280.28.

In 1872 the eastern pier was extended at a cost of \$4,081.91, and in 1876-77 the western pier, which was much decayed, was repaired and partly rebuilt at an expenditure of \$8,579.58. The eastern pier was repaired and extended so as to reach 10 feet at low water.

During 1881 and 1882, a block 30 x 50 feet dimensions was built at the end of the eastern pier to admit the approach of vessels during low tide. A crib-work block, 100 feet in length, was built from the inner end of the pier to the shore, and a road 250 feet long constructed to the main highway.

Neap tides rise 13 feet; springs rise 18 feet.

Total expenditure since Confederation, \$22,721.82 (\$12,661.49 being included in expenditure for Grosse Isle Quarantine Station).

ST. THOMAS DE MONTMAGNY.

St. Thomas de Montmagny is the *chef lieu* of the County of Montmagny, and is on the south shore of the St. Lawrence, thirty-five miles below Quebec.

In 1879-80 an isolated block 30 feet by 30 feet, and having 5 feet of water at its outer end at low water spring tides was built, 100 feet from the shore. In 1880-81 it was connected with the shore, thus forming a convenient landing place for small craft.

Neap tides rise 12 feet; springs rise 20 feet.
Total expenditure since Confederation, \$5,256.96.

BERTHIER (EN BAS).

The village of Berthier is on the south shore of the St. Lawrence, twenty-four one-half miles below Quebec.

A landing pier was completed in 1853, at a cost of \$37,724.14, and the sum of \$1,760 was expended for repairs up to 30th June, 1867. The pier is of stone and wood. It projects into the river, 466 feet; its breadth is 32 feet, but the last 57 feet in the water are increased to 60 feet; its height at the river end is 34 feet, and it had at its completion 15 feet depth of water at its outer end at low spring tides.

In 1877-78, the pier was thoroughly repaired, some of the side timbers and ties which had become decayed were replaced, and the whole roadway planked over to protect it from the heavy seas which frequently broke over the pier, and washed out the broken stone of the roadway.

Neap tides rise 10 feet, spring tides 18 feet.
Total expenditure since Confederation, \$9,024.15.

STE. FAMILLE.

The village of St. Famille is on the Island of Orleans, seventeen miles below Quebec.

In 1876, the inhabitants constructed a small landing pier. In 1879, the Department built a block 30 by 30 feet, and in 1880 extended it and built the two blocks shorewards. The whole has since been connected with the shore and forms a convenient landing place for small crafts, having eight and a-half feet of water at its outer end at half tide.

Neap tides rise 12 feet; springs rise 19 feet.
Total expenditure since Confederation, \$9,323.86.

ST. JEAN D'ORLEANS.

The village of St. Jean D'Orleans is on the island of Orleans, twenty miles below Quebec.

The local authorities built a landing pier here 65 feet by 50 feet, and having 20 feet of water at its outer end, at half tide. It was damaged by ice during the winter of 1880-81, and repaired by the Department.

Neap tides rise 12 feet; springs rise 19 feet.
Total expenditure since Confederation, \$470.93.

ST. LAURENT.

The village of St. Laurent is situated on the Island of Orleans, fifteen miles below Quebec.

In 1860 the construction of a pier to carry a lighthouse was commenced here, and up to Confederation the expenditure had been \$8,416.58. After Confederation the work was completed at a further cost of \$15,979.70. The pier is 583 feet in length. The block at its outer end is 104 feet long by 32 feet wide, and the remainder of the pier is 20 feet wide. There is 7 feet of water at the outer end of the pier at low water ordinary spring tides.

In 1879-80 and '81 some repairs were made to the pier.

Neap tides rise 12 feet; springs rise 19 feet.
Total expenditure since Confederation, \$17,245.83.

QUEBEC HARBOUR.

A survey of the estuary of the River St. Charles, at Quebec, was made during the winter of 1875-76, for the purpose of ascertaining the nature of the bed of the river, of establishing the velocity of the currents, &c. See Appendix No. 7.

Total expenditure since Confederation, \$6,458.02.

LES ECUREUILS.

The village of Les Ecoreuils is situated in the County of Portneuf, on the north side of the St. Lawrence River, 25 miles above Quebec.

During the years 1881-82 a small landing pier 70 feet long by 20 feet wide was built here. The pier is dry at extreme low water, but has 12 feet at its outer end at high water, spring tides.

Neap tides rise 10 feet; spring tides rise 16 feet.

Total expenditure since Confederation \$1,571.13.

RIVER NICOLET.

The River Nicolet empties into the St. Lawrence on its southern shore at the foot of Lake St. Peter.

In October, 1881, a contract was entered into for the construction of works for the improvement of the harbor and the entrance thereto, but, owing to the extreme height of the water in the St. Lawrence during the past summer, the work of pile-driving, etc., was not proceeded with before the close of the fiscal year of 1881-82. The works, as contracted for, are to consist of dredging from the entrance from Lake St. Peter to the harbor proper, a channel 75 feet in width at the bottom and about 5,000 feet in length, with a basin 150 feet in width, the whole to have a depth of 8 feet at extreme low water. The entrance to be protected on either side by pile-work, that on the eastern side of the river to be 3,500 feet in length, and that on the western side 3,100.

Total expenditure, \$594.52.

RIVER DU LOUP (EN HAUT).

The River du Loup (*en haut*) empties into Lake St. Peter, on the north shore, County of Maskinongé, 21 miles west of Three Rivers.

In 1873, the sum of \$2,000 was expended in the improvement of the channel at the mouth of the river.

Total expenditure since Confederation, \$2,000.

RIVER YAMASKA.

The Yamaska rises in the County of Brome, and, after a course of over ninety miles, falls into the St. Lawrence at the head of Lake St. Peter.

A contract has been entered into for the construction of a lift lock and dam at Ile à Cardin, one and three-quarter miles below the village of St. Michel, and about four and a half miles from the mouth of the river. By the construction of these works, and dredging through the shoal below the lock, the river will be rendered navigable for vessels of moderate draught to Belle Point or Rapid de la Grosse Roche, a distance of twenty miles. At the close of the fiscal year about one-sixth of the work had been completed.

Total expenditure since Confederation, \$7,008.02.

BERTHIER, (EN HAUT.)

The village of Berthier, *en haut* is on the north shore of the St. Lawrence, forty-five miles north-east of Montreal, and opposite Sorel at the mouth of the Richelieu River.

In 1881, dredging was done here to give a depth of nine feet below low water mark over the Vanasse, Church and Leveque Shoals opposite Berthier, to enable vessels to come to the wharves at the Village.

Total expenditure since Confederation \$4,340.32.

CHENAL DU MOINE.

The Chenal du Moine, or "Monk's Channel," as it appears on Bayfield's Chart, is one of the channels of the St. Lawrence, about three miles below Sorel.

Great damage has been done here in former years during the breaking up of the ice by its being swept over the low-lying farms along the shore. To obviate this, two ice piers, each 30 feet square, were built in 1880-81, and have so far answered their purpose very well.

Total expenditure since Confederation, \$1,957.97.

ILE AUX NOIX.

Ile aux Noix is in the River Richelieu near the southern boundary of the Province.

On this island the British Government, many years ago, erected Fort Lennox, which was transferred to the Province of Canada, in 1855, and used as a reformatory prison from 1858 to 1862. Access to the fort is had by a road from the public highway at the village of St. Valentine to the river, and thence by ferry to the island. It being maintained that this road was the property of the Dominion, extensive repairs were made in 1880-81, to the bridge crossing a dry gully, which had become dangerous.

Total expenditure since Confederation, \$838.67.

RIVER RICHELIEU.

The River Richelieu flows into the St. Lawrence, on its southern side, at Sorel, forty-five miles below Montreal.

During the season of 1880-81 the channel was deepened below the lock at St. Ours; obstructions were removed above the Lock; the entrance to the wharves at St. Denis improved; the channel cleared at Belœil, and the entrance to the Chambly canal deepened to 8 feet at low water.

Total expenditure since Confederation, \$46,657.22.

RIVER L'ASSOMPTION.

The River L'Assomption discharges into the St. Lawrence above the Village of Repentigny, in the County of L'Assomption.

At Charlemagne, at the mouth of the river, dredging was carried on in 1881 on the boulder shoal off the steamboat wharf, and in making a cut to the mill channel, giving 10 feet depth at low water.

Total expenditure since Confederation, \$5,714.55.

LONGUE POINTE.

Longue Pointe is in the County of Hochelaga, six miles below Montreal, on the north shore of the St. Lawrence.

It having been found that obstructions existed in the channel of the route used by the ferry steamer plying between Longue Pointe and the village of Boucherville, in the County of Chambly, on the south shore of the St. Lawrence, a dredge was placed at work in May, 1882, for the purpose of giving 7 feet at low water in the channel, and at the close of the fiscal year had removed 10,228 cubic yards of material.

Total expenditure since Confederation \$2,212.50.

MONTREAL.

The port of Montreal is under charge of the Board of Harbour Commissioners, whose report on the deepening of the channel between Montreal and Quebec will be found in Appendix No. 10.

LAPRAIRIE.

Laprairie is the *chef lieu* of the County of the same name, and is situated on the southern shore of the St. Lawrence, seven miles above Montreal.

In May, 1882, a dredge was placed at work to deepen to 7 feet at low water around the front and sides of the public wharf, and was so engaged at the close of the fiscal year, having up to that time removed 1,725 cubic yards of material.

Total expenditure since Confederation \$417.23.

CHATEAUGUAY RIVER.

The Chateauguay River runs through the whole length of the County of Chateauguay and flows into Lake St. Louis.

The entrance of the river (east of Sisters' Island) was improved by dredging in 1876. Total expenditure since Confederation \$3,283.79.

BEAUHARNOIS.

Beauharnois is the *chef lieu* of the County of the same name, and is situated on the southern shore of Lake St. Louis, River St. Lawrence, twenty miles above Montreal.

During the summer of 1881 a dredge was at work here, deepening to 9 feet around the wharves, and the channel therefrom to the main channel of the river.

Total expenditure since Confederation \$6,772.96.

MOORING PIERS.

Prior to Confederation three mooring piers were built in the St. Lawrence for the convenience of steamers and other vessels navigating that river. The piers were located at the head of the Lachine Rapids, at the head of the Cascades and three miles above the village of the Cedars, immediately above "La Chute aux Bouleaux." The piers were each 70 feet long by 20 wide and consisted of crib work filled with stone, their purpose being to afford steamers and other vessels arriving at the head of a rapid during a fog or at night, a place to tie up. The cost of these piers was \$8,859.

Since Confederation these piers have been repaired and new piers built at Coteau Landing.

See the Cedars, St. Dominique, St. Zotique, Coteau Landing for particulars.

BACOT HAYES SHOAL.

Bacot Hayes Shoal is on the south side of the St. Lawrence, about $2\frac{1}{2}$ miles below the village of the Cedars, in the County of Soulanges.

This shoal is in the steamboat channel, and has been a great obstruction to navigation, as there was only $6\frac{1}{2}$ feet depth of water at low water, and in the fall of the year, when the water is usually very low, steamers running the rapids, and drawing about 7 feet, were obliged to bring their engines to a full stop before venturing to pass this dangerous place.

During the season of 1881-82 operations were commenced and carried on for the purpose of opening a new channel about 200 feet to the northward of that hitherto used. This new channel will be 150 feet in width, and have a depth of 8 feet at the lowest stage of water, and steamboats will be able to navigate it with ease and safety without slowing down. At the close of the fiscal year, 1881-82, about two-thirds of

the work had been performed, and the remainder will be completed during the fiscal year 1882-83.

Total expenditure since Confederation, \$3,691.30.

ST. TIMOTHÉE.

The village of St. Timothée is in the County of Beauharnois, on the south shore of the St. Lawrence, at the head of the Cedars Rapids, and about nine miles above the town of Beauharnois.

Towards the close of the fiscal year, 1882, material was purchased for the construction of a landing pier at this place. The pier will consist of a block 100 feet by 24 feet, having from $6\frac{1}{2}$ to $7\frac{1}{2}$ feet depth of water at low water along its front, and be connected with the shore by a roadway 237 feet long and 12 feet wide.

Total expenditure since Confederation, \$11.10.

CEDARS

Is a village in the County of Soulanges, on the northern shore of the St. Lawrence, thirty miles above Montreal.

A landing pier was built here by the local authorities, and during the year 1881-82 it was reconstructed by the Department. The pier is 100 by 24, with an ice-breaker 15 feet in length at its upper end, and has a depth of $7\frac{1}{2}$ feet at low water. The pier is connected with the shore by a bridge 55 by 15, and has on it a commodious storehouse.

Total expenditure since Confederation, \$3,761.01.

ST. DOMINIQUE.

The village of St. Dominique des Cedres is in the County of Soulanges, on the north shore of the St. Lawrence, about thirty-two miles above Montreal, at the head of "La Chute à Bouleaux."

In 1856 a mooring pier for the convenience of steamers or vessels which may be overtaken by night or fogs at the head of the rapids, was built at a cost of \$2,953.

In 1880 this pier was rebuilt above the water line and connected with the shore by a roadway 24 feet wide. The dimensions of the pier are 75 feet by 24 feet, and on its up stream side it has an ice-breaker. Depth of water at lowest water, 15 feet along whole front of pier.

Total expenditure since Confederation, \$1,952.74.

COTEAU LANDING.

Coteau Landing is in the County of Soulanges, opposite the entrance to Beauharnois Canal; at the foot of Lake St. Francis, and the head of the Coteau Rapids.

In 1871 a mooring pier was built at a distance of 800 feet from the shore; and in February, 1872, a contract was entered into for the enlargement of the pier and its connection with the shore so that it may serve as a landing place for the mail steamers navigating the St. Lawrence and lakes. The pier was completed in October, 1874. It is 249 feet in length by 24 feet wide, with an ice-breaker 30 feet long at its up stream end, and has a depth of 13 feet at low water along its outer face. The connection with the shore is 12 feet wide, except for a length of 100 feet near the outer end where it is 24 feet wide, to give vehicles going different ways room to cross each other.

Total expenditure by the Department since Confederation \$11,461.88.

ST. ZOTIQUE.

St. Zotique is situated in the County of Soulanges, at the foot of Lake St. Francis three miles above Coteau Landing.

The mooring pier at Coteau Landing having been found to be too near the head of the Coteau Rapids for the safety of rafts and steamers requiring to tie up, a sum of \$3,500 was placed in the Estimates, 1881-82, to erect a mooring pier at St. Zotique. The pier is intended to be 100 feet long by 24 feet wide, and to be placed about 1,200 feet from the shore in 12 feet at low water. During the winter of 1881-82 some of the material required was got out, but construction had not been commenced at the close of the fiscal year. The pier will be connected with the shore by a roadway 12 feet wide, carried on piers 12 by 8 feet deminsion.

Total expenditure since Confederation, \$1,070.75.

ST. ANICET.

The village of St. Anicet is in the County of Huntingdon, on the right bank of Lake St. Francis, fifty-six miles south-west of Montreal.

A landing pier was built here in 1862, at a cost of \$1,920. It is 300 feet long; the width of the 200 feet nearest the shore is 18 feet, and of the outer 100 feet, 34 feet. No expenditure has taken place since Confederation.

RIVER À LA GRAISSE.

The River à la Grasse flows through the County of Vaudreuil and empties into the Ottawa on its southern side, about forty-five miles above Montreal. On it three miles from the mouth, is situated the Town of Rigaud, the *chef lieu* of the County; and during the season of 1880 and 1881, dredging was done in a portion of the channel of the river so as to give a depth of 6 feet.

Total expenditure since Confederation, \$6,401.76.

ST. PLACIDE.

The village of St. Placide, in the County of Two Mountains, is situated on the northern bank of the Ottawa river, about eighteen miles above its junction with the St. Lawrence, and nine miles from St. Andrews.

In 1879 work was commenced to dredge a channel, 1,000 feet in length by 50 feet wide, and having a depth of 6 feet at low water, from the main channel of the Ottawa to the public wharf at St. Placide, and also to dredge a turning basin 70 feet width. The work was not finished in 1879, and was resumed in 1882, and was in progress at the end of the fiscal year.

Total expenditure since Confederation, \$1,719.51.

RIVER DU NORD.

River du Nord, or North River, rises in the County of Terrebonne and flows through the County of Argenteuil, emptying into the Ottawa at the head of the Lake of Two Mountains.

The Village of St. Andrew's is about three miles from the mouth of the river. During the seasons of 1880 and 1881 a number of boulders were removed from the bed of the channel about half a mile below the village, leaving a depth of $4\frac{1}{2}$ feet at low water over a width of 70 feet.

Total expenditure since Confederation, \$1,627.51.

RIVER DU LIÈVRE.

The River du Lièvre is a tributary of the Ottawa and falls into that river on the northern shore, in the County of Ottawa, about 18 miles below the City of Ottawa.

During the summer of 1881 the channel of the river was deepened at Little Rapids, about ten miles above the village of Buckingham, by blasting a reef which extends

across the river at that point; and also in removing boulders from the Long Rapids for the purpose of facilitating the navigation of the river by craft engaged in the transportation of phosphates. The depth of water available in the channel is now 3 feet at the lowest stage of water.

Total expenditure since Confederation, \$4,316.89.

RIVER SALMON.

The River Salmon is a tributary of the Ottawa, into which it flows near Montebello, seventy miles above Montreal.

In September and October, 1880, the channel of the river was dredged to obtain a depth at 6 feet of low water.

Total expenditure since Confederation \$746.16.

CALUMET.

Calumet is on the north shore of the Ottawa River, about sixty miles below the City of Ottawa, and sixty miles above Montreal.

In July, 1880, dredging was done here to give 6 feet at low water, so as to allow the entrance of the steamer plying to Hawkesbury, Ont., in connection with the Quebec, Montreal, Ottawa and Occidental Railway.

Total expenditure since Confederation, \$1,164.90.

RIVER GATINEAU.

The Gatineau is one of the principal tributaries of the Ottawa, into which flows, on its northern side, below the City of Ottawa.

During 1874 and 1875, very extensive dredging was done.

In the fall of 1881 the water was extremely low, and a passage for barges had to be cut through the shoals in the channel near the railway bridge.

Total expenditure since Confederation, \$39,264.17.

PROVINCE OF ONTARIO.

OTTAWA RIVER.

Immediately below the Union Suspension Bridge there existed a small rock island, the top of which was removed some years ago to nearly the summer level of the Ottawa, and this, during the season of freshets, became a submerged reef, which was a cause of much hindrance to navigation.

During the extremely low water of 1881, the top of this reef was removed to an average depth of about 3 feet.

Total expenditure by the Department since Confederation for removing reef, \$4,933.19.

L'ORIGINAL.

The village of L'Original is on the south shore of the Ottawa River, about a mile and a-half miles above the head of the Carillon and Grenville Canals at Grenville. It is the capital of the United Counties of Prescott and Russell, and is sixty-six miles west of Montreal.

A pier 554 feet in length and 24 feet wide was built prior to 1841; and, in 1841 and 1858 it was extended 800 feet by the municipal authorities, the Government contributing \$2,000.

No expenditure since Confederation.

HAWKESBURY.

Hawkesbury is on the southern side of the Ottawa River, in the County of Prescott, about 60 miles from Ottawa.

During 1881-82 the channel from the rear of Grant's Point on the Ottawa to the village wharves was dredged to a depth of 6 feet at low water.

Total expenditure by the Department since Confederation, \$1,164.90.

GANANOQUE.

Gananoque is in the County of Leeds on the north shore of the St. Lawrence, at the mouth of the Gananoque River. It is eighteen miles north-east of Kingston and thirty miles west of Brockville.

In 1881 the sum of \$245.17 was expended in dredging the Gananoque River so as to admit the entrance of a larger class of vessels for grain freights.

Total expenditure by the Department since Confederation, \$245.17.

KINGSTON.

Kingston is situated at the outlet of Lake Ontario, 172 miles west of Montreal, and is an important commercial centre.

The work executed here by the Department consisted of dredging the Carruthers shoal, so as to obtain 13 feet at the lowest stage of water; and was performed during the seasons of 1874-75-76.

Total expenditure by the Department since Confederation, \$14,814.40.

PORTSMOUTH.

Portsmouth is situated on the Bay of that name, two miles from Kingston.

During the year 1881-82 a portion of the basin was dredged to a depth of 13 feet.

Total expenditure by the Department since Confederation, \$3,390.40.

PICTON.

Picton harbor is on the south side of the Bay of Quinté, Lake Ontario, thirty-six miles south-west of Kingston, and eight miles to the eastward of Belleville.

Prior to Confederation, the Government expended \$8,424 in dredging a channel 140 feet wide, and having 9 feet at low water, from the wharves at the head of the bay to deep water outside.

In 1874 the sum of \$6,000 was expended in dredging the harbour; and in 1878 and 1879 a further sum of \$5,684.60 was spent in removing the old pier at the outer limit of the harbor, in widening the entrance and to give a depth of 10 feet. Some farther dredging was also done in 1880 and 1882.

Total expenditure by the Department since Confederation, \$13,487.85.

NAPANEE.

The town of Napanee is the commercial centre of the united Counties of Lennox and Addington, and is situated on the right bank of the River Napanee, about five miles above its discharge into the Bay of Quinté, Lake Ontario.

Several shoals obstruct the river, and, in 1861, the Department spent \$1,078 in excavating a channel half a mile in length to a depth of 9 feet, through a shoal over which there had previously been only 6 feet.

In 1873-74 the sum of \$4,999.73 was expended in dredging; and in the year 1875-76 the sum of \$14,027.07 was spent for the same purpose, of which sum the Counties of Lennox and Addington contributed \$2,000, and the Town of Napanee \$3,000.

Total expenditure by the Department since Confederation, \$19,026.80.

SHANNONVILLE—SALMON RIVER.

Shannonville is situated on the Salmon River which empties into the Bay of Quinté, about nine miles from Belleville, and forty and a-half west of Kingston.

The village is two miles from the mouth of the river, and the channel leading to the wharf is deep, but the mouth of the river is obstructed by a bar composed of sand and sawdust. In 1874-75, the sum of \$2,992.94 was expended in dredging this bar and in 1881-82, \$1,088.43 was spent for the same purpose, a length of 1,700 feet by a width of 40 feet being dredged to 8 feet.

Total expenditure by the Department since Confederation, \$4,906.47. (See page 113 and 117.)

BELLEVILLE.

Belleville is the capital of the County of Hastings, and is situated at the mouth of the River Moira, which flows into the Bay of Quinté, forty-three miles west of Kingston, and 113 east of Toronto.

The harbor is well sheltered, but was obstructed by several shoals, partly formed by the sawdust and mill refuse brought down by the river. Several attempts at dredging were made by the municipality, and, in 1874, the Department expended \$10,000 in continuing the work so commenced; and, in 1875, and subsequent years up to 1882, further dredging was done, towards which the municipality contributed \$3,000.

Total expenditure since Confederation, \$22,688.24.

TRENTON.

Trenton is at the head of the Bay of Quinté, sixty miles above Kingston and twelve from Belleville.

During the seasons of 1878-79 and 1880 dredging operations were carried on here to obtain a channel 150 feet wide, having a depth of 10 feet at low water. In 1881-82 an old crib-work pier was removed from the river.

Total expenditure by the Department since Confederation, \$6,418.54.

CONSECON.

Consecon is at the head of Weller's Bay, Lake Ontario, in the County of Prince Edward.

During the months of October and November, 1881, dredging was done on the shoals obstructing the entrance to the harbour, affording only partial relief.

Total expenditure by the Department since Confederation \$3,236.13.

PRESQU'ILE.

The harbor is situated on the north shore of Lake Ontario, immediately above the peninsula of Prince Edward, and about seventy-eight miles above Kingston.

The only expenditure made by the Government prior to Confederation was \$62 for the placing of buoys to mark the entrance to the harbor.

On the 9th of May, 1871, an Order in Council was passed accepting the transfer from the Government of Ontario to the Dominion Government of this harbor, and providing that the sum of \$10,000 be expended in improving it.

In 1872 the work of dredging was commenced and completed in 1875, a channel varying from 220 feet to 160 feet in width, and having 12 feet of water, having been dredged through the shoal known as "The Middle Ground."

Total expenditure by the Department since Confederation, \$26,981.34.

COBOURG.

The town of Cobourg is situated on Lake Ontario, about ninety-six miles west of Kingston, and seventy-two miles east of Toronto.

The work of forming a harbour here was commenced by a company organized by an Act of Parliament passed in 1829. In 1842 the works were assumed by the Government and held until the 27th May, 1850, when they were sold to the Town Council of Cobourg for the sum \$16,000.

Prior to the Union of the Provinces in 1841, the Government had spent \$20,010.72 on this harbour; and after the Union the sum of \$41,999.98 was advanced as a perpetual loan at 6 per cent. interest.

At the time of Confederation, 1867, the works consisted of two piers, the united length of which was 2,047 feet. They were 190 feet apart at the entrance of the harbour and enclosed an area of about twelve and a-half acres of water, the depth at the outer end of the east pier being 14 feet, decreasing from 7 to 8 feet in the centre of the basin.

In 1873 a survey of the harbour was made and an agreement entered into with the Harbour Commissioners for the improvement of the harbour, the Commissioners to pay one third of the cost and the Government two thirds. Under this agreement a contract was entered into in September, 1873, for the construction of a pier 1,500 feet long and 30 feet wide, from the foot of Hibernia street. The first contractors failing to do anything were relieved of their contract and the work given to other parties who commenced it on the 15th May, 1875, and completed in September, 1876. The total expenditure was \$79,569.68, of which the Harbour Commissioners furnished \$25 507.49.

In 1881-82 an arm 150 feet in length, in a south easterly direction was placed under contract, but owing to the failure of the contractor it had not been completed at the close of the fiscal year.

Total expenditure by the Department since Confederation, \$92,161.89.

PORT HOPE.

Port Hope lies on the north shore of Lake Ontario, seven miles above Cobourg and 102 miles above Kingston.

In 1829 the Port Hope Harbor and Wharf Company was incorporated; and in 1832 the Company obtained a loan of \$8,000 from the Government. In 1852 the Company sold the harbor to the Town Council of Port Hope for \$46,000, and by an Act of Parliament, passed in 1853, this sale was confirmed and the harbor vested in Commissioners acting as trustees for the benefit of the Town Council. By the Act 28 Vic., chap. 86, assented to 30th June, 1864, authority was given to the Port Hope, Lindsay and Beaverton Railroad Company to acquire and hold this harbor. The amount expended by the Government prior to Confederation was \$58,680.26; and the works consisted of two piers, the eastern extending 600 feet into the lake, and the western 400 feet. The width at the entrance was 104 feet, and the piers reached to 13 feet at low water; but there was only a depth of 9 feet at the entrance to the harbor, which had an area of about three acres.

In 1875-76 the western pier was extended 150 feet on a width of 30 feet, and the eastern pier 120 feet on a width of 40 feet, and the entrance dredged to 13 feet. During the summer of 1882 the work of extending the eastern pier 100 feet was commenced, and a considerable quantity of dredging was also done.

Total expenditure by the Department since Confederation, \$30,401.69.

NEWCASTLE.

The harbour of Newcastle is in the County of Durham, on Lake Ontario, forty-seven miles east of Toronto.

In 1878 the sum of \$5,000 was granted to assist the Harbor Trust in dredging the harbour, so as to obtain a depth of 10 feet at low water.

Total expenditure by the Department since Confederation, \$5,000.

PORT DARLINGTON.

Port Darlington is situated on Lake Ontario, two and a-half miles from Bowmanville, and about forty miles east of Toronto.

The harbor consists of two piers 1,180 feet and 1,620 feet in length respectively, which were built by the municipality.

In 1875-76, the Government dredged the harbor to a depth of ten feet.

Total expenditure by the Department since Confederation, \$5,000.

OSHAWA.

The town of Oshawa is situated on Warren's Creek, in the County of Ontario, about thirty-five miles from Toronto.

The harbour is on Lake Ontario, about a mile and a-half from the Grand Trunk station, and here a pier was built by the municipality.

In 1875 the Government granted \$5,000 towards enlarging the pier and dredging the harbour, the Harbour Trust at the same time expending \$9,968.

Total expenditure by the Department since Confederation, \$5,000.

WHITBY.

The Harbor of Whitby, formerly Windsor Harbor, is on the north shore of Lake Ontario, about 135 miles above Kingston and thirty from Toronto. It is a mile distant from the Grand Trunk Railway, the Town of Whitby being two miles north of the railway.

The harbor is formed by a breakwater 3,042 feet in length, both ends touching the shore and having an opening 250 feet wide at about 800 feet from the eastern end. The entrance is guarded by two parallel lines of crib-work, built at right angles to the breakwater and extending the eastern 399 feet and the western 62 feet, into the lake. The area of the harbor is about 108 acres, and the general depth 3 to 5 feet, the dredged portions having from 10 to 12 feet.

The breakwater was built in 1843-46 and the harbor dredged 1847-50; the total expenditure up to October of that year being \$178,703.37. By an Order in Council dated 13th August, 1850, the harbor, together with the road leading from it to Lake Scugog, was sold for \$80,400 to the Port Whitby and Lake Scugog, Simcoe and Huron Road Company. This Company made default in its payment, and the road and harbor were resumed by the Government on 19th May, 1863; and, on 21st March 1864, the harbor was sold to the Port Whitby Harbor Company for \$35,150, and the road to another company for \$10,000.

In 1874 a survey of the harbor was made, when it was reported that the breakwater east of the entrance was entirely covered with a deposit of sand; that much of the western side of the breakwater was similarly affected, and that such portions of it as were exposed were in a decayed state throughout. The crib-work of the pier under water was reported in good condition, but the superstructure of the western pier decayed.

No expenditure, beyond this survey, has been made by the Government since Confederation.

PICKERING.

The harbour of Pickering, formerly known as Frenchman's Bay, is situated on Lake Ontario, twenty-one miles east of Toronto.

Two piers were built here some years ago, by the local authorities; and, in 1877 and 1879, the Department extended the western pier 60 feet, and dredged between the two piers so as to give a depth of 11 feet at low water.

Total expenditure by the Department since Confederation, \$4,999.

TORONTO.

The Harbor of Toronto is situated on the north shore of Lake Ontario, 333 miles by rail south-west from Montreal, 161 miles from Kingston and 39 miles north by east from Hamilton. It is formed inside of the Island and has its principal entrance from the westward.

An entrance from the eastward has existed for some years, but owing to its shallowness is not used by steamers or sailing craft.

At the north-east corner the Don empties, and the eastern side is bounded by marshy lands of many acres in extent, which separate it from Ashbridge's Bay.

Since 1778 many physical changes have taken place in this harbor.

Toronto Island, once a peninsula, was separated from the mainland in 1858, when a small breach was opened by the sea through the beach, gradually increasing, until at the present time it has a width of 1,800 feet when Lake Ontario is at its normal summer level.

Many changes have taken place in the island. It had decreased in width and extent at the eastern end, and largely increased at the western, and to such an extent that for some years dredging has had to be carried on in the western channel to maintain a width of 300 feet and a depth of 14 feet below zero of the gauge at the Queen's Wharf.

Between the 1st July, 1874, and 30th June, 1880, the sum of \$49,120.90 was expended principally in increasing the width and depth of the Queen's Wharf channel, and to obtain a depth of 16 feet at low water, it was found to be necessary to blast in the solid ledge, and, to a certain extent, this was done. During 1880 and 1881, dredging only was carried on, no further attempts having been made in the removal of rock.

The question of the maintenance and improvement of this harbor having been brought prominently to the notice of the Hon. Minister; an examination was made in 1881, by Mr. James B. Eads, C.E., of St. Louis, Mo., and his report will be found in the Annual Report of the Department, 1881-82, app. page, 77.

During the spring of 1882, the marshes bounding the eastern side of the harbor and the whole southern shore of the island were damaged to such an extent as to necessitate almost a complete departure from the plans suggested by Mr. Eads for the preservation and protection of these portions, and works of an aggregate length of 13,130 feet have been placed under contract.

The Harbor of Toronto is managed by a Board of Commissioners who collect and retain all tolls collected on vessels using the port.

Prior to Confederation, the sum of \$22,965 had been expended in connection with this harbor, and since then and up to 30th June, 1882, a further sum of \$70,589.95 has been expended.

OAKVILLE.

Oakville is on the north shore of Lake Ontario, in the County of Halton, nineteen miles above Toronto.

At the date of the Union of the Provinces, in 1841, the amount expended in levies on the two piers forming the harbour at Sixteen Mile Creek, was \$14,361.08, of which \$10,000 bore interest at 6 per cent.

In 1872-73 the sum of \$497.46 was expended.

Total expenditure by the Department since Confederation, \$588.20.

PORT DOVER.

This harbor lies at the mouth of Patterson's Creek, on the north shore of Lake Erie, forty-nine miles above the upper entrance to the Welland Canal.

On the 28th January, 1832, a Joint Stock Company was incorporated under the name of "The President, Directors and Company of the Port Dover Harbor," with a capital of \$20,000, for the purpose of constructing a harbor. The works were to

be commenced in two, and completed in seven years. This time was extended by subsequent Acts of Parliament; a loan of £3,500 made to the Company, and authority given to increase the capital to \$40,000. On 29th July, 1843, the works were transferred to the Government, and the piers were then completed and extended to deep water. On 15th October, 1850, an Order in Council was passed, selling the harbor to the "Port Dover Harbor Company," for the sum of \$30,400. In 1863, the harbor was again resumed by the Government, and further repaired and improved.

The total expenditure by the Government up to Confederation was \$44,391.61.

The works consisted of two parallel piers 75 feet apart, and projecting into the lake about 1,000 feet, the channel between the piers having a depth of 10 feet.

In 1868 and 1869 the superstructure of the piers was repaired; and the mouth of the channel, which had filled up a little, was dredged out in 1871.

By an Order in Council passed 1st May, 1877, the harbor was sold to the Port Dover and Lake Huron Railway Company for \$6,200.

Total expenditure by the Department since Confederation, \$2,661.46.

PORT BURWELL.

Port Burwell lies on the north shore of Lake Erie, about ninety miles above Port Colborne. It is sixty-two miles from Rondeau, and twenty-two miles from Long Point.

This harbor was formed by a Company, incorporated in 1832, which received a loan of £3,000 from the Government. In 1840, the works were surrendered to the Government; and in 1860, the deed of surrender was annulled.

The only expenditure made by the Government after the Union of the Provinces was \$546 for surveys.

A thorough survey was made in 1874, up to which time the Company claimed that it had expended \$100,100 on the harbor.

In 1876-77, the sum of \$10,055.37 was expended in repairing the breakwater and in dredging the harbor to a depth of 10 feet.

PORT BRUCE.

Port Bruce is at the mouth of Cat Fish Creek, on the north shore of Lake Erie, 100 miles above Port Colborne.

This harbor was constructed by the Port Bruce Harbor Company, and consisted of two piers, one 700 and the other 750 feet in length, placed 115 feet apart.

Prior to Confederation, the Government spent \$6,267.47 on this harbor.

Nothing has been expended by the Department since Confederation.

PORT STANLEY.

Port Stanley is at the mouth of Kettle Creek, in the County of Elgin, on the north shore of Lake Erie, about eighty-five miles from the entrance to the Welland Canal and Port Colborne, and twenty-four miles distant from the City of London by the London and Port Stanley Railway, of which road it is the terminus.

In 1827 an Act was passed by the Parliament of Upper Canada appointing Commissioners to make a harbour, and appropriating £3,000 for the purpose; which sum was further supplemented by grants of £3,500 and £2,000. After the Union of the Provinces very extensive repairs and improvements were made. The total sum expended up to Confederation amounting to \$230,531.88. By an Order in Council dated 1st September, 1859, the harbour was transferred to the London and Port Stanley Railway Company, on condition that the tolls collected should be applied to the maintenance of the works.

In 1870, when an extensive survey of the harbour was made, the works consisted of two lines of piers placed 86 feet apart at the outer and 82 feet apart at the inner end. The western pier was 1,456 feet in length, with a width of 20 feet for 548 feet

of the shore end, and 30 wide for the remainder of its length. The eastern pier was 1,150 feet in length, and 30 feet wide. From the inner side of the western pier a docking, $11\frac{1}{2}$ feet in width, was continued on the same line northward for 882 feet, in which there was a recess 90 feet long by 53 feet deep. This docking formed the west side of the harbour. From the inner end of the eastern pier a line of pile-docking formed the eastern side of the harbour. The inner basin was about 850 feet long, by an average width of 280 feet containing nearly five and a-half acres, a small portion of which had a depth of from 7 to 11 feet; but the greater part—over four acres—had only a depth of from 1 to 5 feet.

In 1876 and 1877 an extension was built to the western pier 85 feet in length by 30 feet wide, at a cost of \$8,158; and in 1882 the outer end of this pier, which had settled, was raised to its original height, at a cost of \$600, for the purpose of placing a lighthouse on it.

Total expenditure by the Department since Confederation, \$8,758.00.

RONDEAU.

Rondeau is situated at Pointe aux Pins, on the north shore of Lake Erie, 140 miles above Port Colborne.

Pointe aux Pins projects into the lake, and encloses a natural basin of above 6,000 acres in extent. The communication between the basin and the lake is over a sand bank 120 feet broad, some parts of which are above the level of the water. In 1844 a breakwater was built here by the Government, and in 1851 the harbour was sold to the Rondeau Harbour Company for \$8,000, on condition that the works should be kept in an efficient state of repair, but this stipulation being wholly neglected possession was resumed by the Government on 26th July, 1866, when the works were repaired.

The total expenditure up to Confederation being \$74,737.70.

In 1869 a survey was made with a view to establishing a harbor of refuge, when all the works, with the exception of the eastern breakwater, were found to be in a ruinous condition; the rapid current had scoured out the channel between the entrance piers to a depth of from 17 to 22 feet, undermining the piers and causing part of them to fall inwards, while about 350 feet of the outer ends of both piers had entirely disappeared.

In January, 1871, a contract was signed for building the piers, enlarging the channel, deepening the basin, and other works required for a harbor of refuge; and the work was continued for the next four years, the amount expended being \$181,665.52. The works consisted of two parallel piers, 783 feet in length, 250 feet apart placed north and south, having a depth of 15 feet of water between them; a breakwater 225 feet in length, and dredging an area of ten acres in the inner basin to a depth of 15 feet.

In 1877 an examination was made of the openings caused by severe storms in the sand banks protecting the harbor, when it was found that although the depth of water in the channel had not decreased, the inner basin had been partly filled up by sand carried in through the breaches in the bank.

In 1881 a contract was entered into for the construction of 2,000 feet of pile protection work on the beach to the westward of the entrance which was not completed at the end of the fiscal year, the expenditure to that time being \$11,529.96. The work so far done has been highly successful, for not only have the breaches through the sand each become closed, but the beach itself has formed on the lake side for a distance varying from 50 to 100 feet beyond the former line of high water. During the year, 1881-82, the sum of \$3,015 was expended in opening a channel into and through Mill Creek.

Total expenditure by the Department since Confederation, \$197,890.76.

RIVER DETROIT.

The Lime Kiln Shoal, River Detroit, which extends over a length of 900 feet, below the Canada Southern Railway Dock, at Amherstburg, consists of out crops of rocks.

and deposits of boulders. This shoal is in Canadian waters and in the main channel of the river. The shallow spots vary from 12.5 feet upwards at low water. In the summer of 1876, \$7,260.32 were expended in removing much of the rock obstructions. Total expenditure since Confederation, \$7,260.32.

RIVER THAMES.

The River Thames flows through the fertile western peninsula formed by Lakes Erie and Huron, and after a course of about 160 miles empties itself into Lake St. Clair. It has several flourishing villages on its banks, and the Town of Chatham and City of London. The river is shallow, and only available for vessels of very light draught as far as London; but to Chatham a channel has been dredged, having a depth of 11 feet. This work was performed in 1871, 1873-74, 1876, 1879 and 1880.

Total expenditure by the Department since Confederation, \$18,828.31.

RIVER SYDENHAM.

The River Sydenham discharges into Mitchell's Bay, Lake St. Claire. In 1875-76, a channel, 50 feet in width and 10 feet in depth, was dredged from the Town of Dresden to Simpson's Bend, a distance of 8 miles. Below the latter point to Mitchell's Bay, the navigation is uninterrupted. The Government dredge "Challenge" performed the work.

Total expenditure since Confederation, \$8,265.16.

BAYFIELD.

The village of Bayfield, is situated at the mouth of the river of the same name which empties into Lake Huron, twelve miles south of Goderich.

The harbor as originally formed by the municipality, consisted of two piers, 618 and 620 feet in length, 200 feet apart at the renewed part, and 330 feet apart at the inner or land end. In 1874, an appropriation of \$34,000 was made by Parliament for the improvement of this harbor; the municipality of Stanley contributing \$10,000. The work was placed under contract in November, 1874, and proceeded with during the seasons of 1875-76 and 1877; and some expenditure for dredging has since been made.

The improvements consist of a prolongation of the northern pier, 105 feet on the outer side, with an arm of 156 feet, turned to the south-west; of a pier on the south side generally parallel to the main line of the opposite pier 180 feet distant from it, being 553 feet in length, with a return to the coast line of 153 feet. All the crib work is 30 feet wide.

Total expenditure since Confederation, \$61,517.55.

GODERICH.

Goderich is situated at the mouth of the River Maitland on the east coast of Lake Huron, sixty-eight miles from Sarnia. It is the terminus of the Buffalo Branch of the Grand Trunk Railway, and is a place of considerable importance, partly on account of the large deposits of salt found in its vicinity.

The construction of a harbour at this place was first undertaken, in 1855, by the Canada Company, who held the right under a lease from the Crown; but although a considerable expenditure was made on the works, they were allowed to fall into decay. In 1859, the Canada Company transferred their claims in the harbour to the Buffalo and Lake Huron Railway Company (now part of the Grand Trunk system), who, in 1862, were granted a new lease from the Crown, one of the conditions of which was that the Company should make and maintain a harbour sufficient to accommodate the largest class of vessels navigating Lake Huron. Under

his lease the Company erected extensive harbour works and established a line of propellers to Chicago.

When it was determined by the Government to establish harbours of refuge on Lake Huron, Goderich was one of the points selected as most suitable, and a survey was made and plans adopted for creating a large and safe harbour. (See Annual Report for 1870, Appendix 11, pages 40 and 44.) The plan adopted may be briefly explained as that of changing the entrance to the harbour by cutting a new channel through the beach and protecting it by crib work, built out to a depth of 17 feet at low water; of considerably increasing the area of the harbour, by dredging; and of diverting the channel of the River Maitland by the erection of an artificial bank, so that the river should discharge into Lake Huron through the north beach and not low into the harbour at all.

These works were commenced in 1872 and completed in 1877, the total cost being \$465,715 81. In 1881 and 1882 dredging to the extent of \$1,748 was done, and, in 1882, \$2,387.06 was spent in repairs and dredging, and in protection works at the beach between the northern pier and the breakwater, which was being gradually washed away.

Total expenditure by the Department since Confederation, \$471,531.16.

PORT ALBERT.

Port Albert is situated on the eastern shore of Lake Huron, about nine miles north of Goderich, at the mouth of Nine Mile Creek.

A small pier was constructed here by the municipal authorities, and in 1875 the Department expended \$6,000 in building an arm to this pier 50 feet in length, and in constructing a small breakwater of cribwork, 75 feet long, on the south side of the creek, to retain any deposit the lake may cast up.

In 1881 and 1882 a row of close piling 300 feet in length was driven from the eastern corner of the pier eastwardly, and the basin so formed dredged to a depth of 10 feet.

Total expenditure by the Department since Confederation, \$9,521.31.

KINCARDINE.

Kincardine is on the eastern coast of Lake Huron, thirty-one miles north of Goderich, at the mouth of the Penetangore River.

In 1856 two parallel lines of piers were built, 100 feet apart, the northern pier being 540 feet in length and the southern one 290 feet. The cost to the Department up to Confederation was \$19,044. In 1868 the sum of \$4,500 was granted to assist the municipality in completing the southern pier. A considerable sum was also expended by the municipality in improving the harbour, the amount being placed at about \$23,000. (See Annual Report, 1880, page 40.)

In 1869 a survey of the harbour was made when it was found that the depth of water at the entrance piers was from 7 to 10 feet, except for a short distance within the outer end of the south pier, where there was only from 5 to 7 feet. The depth in the basin varied from 7 to 10 feet. In 1872 dredging was commenced and was continued until 1877, when the whole of the inner basin, about four acres in extent, had been dredged to 12 feet and the entrance to 13 feet. Since then further dredging has been done, giving 14 feet in the basin and 15 feet at the entrance. The entrance piers have been considerably extended, the direction changed and the entrance widened from 130 feet to 200 feet so as to afford greater facility for entering the harbour. In 1876 the wharf was damaged by a storm and this has been repaired and the superstructure raised. In November, 1881, a contract was let for the construction of 790 feet of pile protection work on the south side of the southern pier; and at the close of the fiscal year the work was half completed.

Total expenditure by the Department since Confederation, \$78,049.68.

INVERHURON.

Inverhuron is on the eastern coast of Lake Huron, in the County of Bruce, twenty-three miles from Southampton and 114 miles above Sarnia.

In 1856-77 a pier 450 feet in length, having 16 feet of water at its outer end, was built by the Government, the total expenditure up to Confederation being \$15,125. This pier was maintained the municipality and some addition made to its length, the cost of which has not been ascertained.

This place was surveyed in 1869, with a view to forming a harbor of refuge; but the work was never undertaken. (See Annual Report for 1870, pages 38 and 45.)

In 1874-75 the old pier was very thoroughly repaired, at a cost of \$6,093.60; and, in 1881, the sum of \$158.58 was expended in renewing 300 feet of the covering of the pier and replacing 200 feet of the waling, which had been destroyed by wear and tear.

Total expenditure by the Department since Confederation, \$6,093.60.

PORT ELGIN.

Port Elgin is in the County of Bruce, on the east coast of Lake Huron, four miles from Southampton and twenty-four from Kincardine.

In 1857 the Government granted \$4,000 to assist a private company in constructing a pier 380 feet in length, to 13 feet water.

For the purpose of opening a harbor of refuge, the construction of a pier 600 feet in length was commenced during the summer of 1882, and about one-eighth of it was completed at the close of the fiscal year.

Towards the construction of this work the village of Port Elgin has contributed \$5,000.

Total expenditure by the Department since Confederation, \$3,180.97.

SOUTHAMPTON.

Southampton is situated at the mouth of the Saugeen River on the east coast of Lake Huron, 143 miles above Sarnia.

Prior to Confederation the sum of \$10,236.39 was granted towards erecting a breakwater to prevent the formation of a bar across the mouth of the river. In 1868 a further grant of \$3,500 was made for extending the work, and in 1871 an additional sum of \$1,500 was expended. In 1881-82, the sum of \$2,549.60 was expended in restoring a length of 700 feet of the superstructure, and flooring of the west breakwater, by laying 500 cubic feet of stone on the lake side of this breakwater at its junction with Chantry Island, and in the construction of a small breakwater 155 feet in length opposite the lighthouse, in order to protect the island at that point.

Total expenditure by the Department since Confederation, \$8,559.60.

CHANTRY ISLAND.

Chantry Island is a small rocky island about half a mile long, lying one and three-fourth miles west, south-west from the mouth of the Saugeen River, on the east coast of Lake Huron, about 133 miles above the foot of the lake at Sarnia.

In 1839, the Government erected a lighthouse on this island, and, in 1856, a breakwater 450 long, and having 18 feet of water at its outer end was constructed. This work was raised in 1885.

The total expenditure prior to Confederation, was \$31,910.95.

In 1869, the question of establishing harbours of refuge along the coasts of Lake Huron and Erie having been considered by the Government, the Chief Engineer of the Department was instructed to investigate the subject, and cause surveys to be made with a view to determining where these harbours should be located.

On 20th January, 1870, Mr. Page, the Chief Engineer, made his Report, (See Annual Report for 1870, Appendix 11, pages 25 to 62) and recommended Chantry Island as one of the best sites for a harbour of refuge.

A contract was signed in January, 1871, and work commenced that season, and completed in 1877.

The works consist of a breakwater 1,600 feet long, extending in an easterly direction from the old breakwater at the northern end of the island. A breakwater 2,000 feet long, on a curved line from the mainland, to within 400 feet of the end of the pier taken out from the island, and a landing pier has been built in the inner harbour, where a quantity of boulder stone has been removed from a shoal adjoining the anchorage ground. A beacon, an octangular structure of timber 50 feet across, carried up 40 feet above water line, has been placed in 16 feet of water on the extreme point of the shoal, running south-west from the island. The breakwaters are built of crib work filled with stone, and there is a talus of stone on each side where the depth is greater than 12 feet.

Total expenditure by the Department since Confederation, \$235,469.81.

TOBERMORY.

The Harbor of Tobermory is situate at the extreme northern end of the County of Bruce, on the channel leading from Lake Huron to Georgian Bay.

It is a large and safe natural harbor of refuge, and the sum of \$349.20 was spent during the fiscal year, 1881-82, in placing ring bolts in the rocky sides of the harbor for the purpose of mooring and protecting vessels.

Total expenditure by the Department since Confederation, \$349.20.

BIG BAY.

Big Bay is on Georgian Bay, about fifteen miles north of Owen Sound Harbor.

The pier is situated on Lot 38, Colpoy's Range, Township of North Keppel. It was constructed in 1877, by the municipality, at a cost of \$993, towards which the Government granted \$400, the balance being paid by the municipality. The pier was then 335 feet long, and reached to 6½ feet depth at low water. In 1881, the pier was extended 117 feet into 11½ feet of water, at a cost of \$1,121.41 of which the Government paid \$500.

Total expenditure by the Department since Confederation, \$900.00.

OWEN SOUND.

The town of Owen Sound is situated on the Sydenham River, which flows into the head of Owen Sound, an arm of the Georgian Bay. The town is the terminus of the Toronto, Grey and Bruce Railway, and the centre of an extensive agricultural district.

Prior to Confederation, the harbour was formed by the municipality of Owen Sound, and in 1856 and 1866, grants were made by the Government to assist in improving the channel of the Sydenham, from its mouth up to the town of Owen Sound. These grants amounted to \$1,300.

In 1874, a survey of the river was made, with a view to improving the channel; and, in 1874 and 1875, the sum of \$10,367.55 was expended by the Department in making a generally straight channel, 150 feet wide, from the wharf at the foot of Peel street to the outer light, a distance of three-quarters of a mile. The depth of water obtained was ten feet at low water. In 1876 and 1877, a channel was dredged from the dry dock to a short distance outside of the outer light, a length of about 2,000 feet. The channel was about 150 feet wide, and had a depth of twelve feet. Cost, \$6,589.77. In 1879, a further sum of \$1,951.30 was spent in dredging a narrow channel, 65 feet wide to a depth of 14 feet.

The enlarging trade of the place demanding greater harbour accommodation, and the increased size of the steamers navigating the lakes requiring a greater depth of water in the harbours, it was decided to make very considerable improvements in the harbour, and the town of Owen Sound agreed to contribute \$13,000 towards the cost. These works consist of the structure of two parallel rows of pile work, 200 feet apart, extending from the shore a distance of 600 feet, together with about 1,000 feet of bank protection, and the dredging of the channel of the River Sydenham, from the upper end of the steamboat wharf to its mouth, and from thence to fourteen feet at low water, a total distance of 5,000 feet. Further deepening of the channel was done during the early part of 1882.

Total expenditure by the Department since Confederation, \$56,781.17.

MEAFORD.

Meaford is an incorporated town in the County of Grey. It is situated on the Georgian Bay, eighteen miles west of Collingwood and twenty to the eastward of Owen Sound.

Prior to Confederation a pier 500 feet long, and having 14 feet of water at its outer end, was built by the local authorities, aided by a grant of \$6,000 from the Government.

This pier, which is on the west bank of the Big Head River, was extended during 1874 and 1875 160 feet, and an arm 200 feet long was built in a north-easterly direction, in order to afford protection against north-east winds. A breakwater 410 feet long was also built on the east side of the river. The cost of these works was \$22,899.29, of which three-fifths was paid by the Government and two-fifths by the Municipality of St. Vincent.

In 1878 the sum of \$250 was expended in dredging; and in 1880 and 1881 \$2,564.94 was spent by the Department in dredging to 12 feet inside the western pier, deepening the channel to the inner harbor, and dredging a portion of the inner harbor, which had been enlarged by the local authorities, to 11 feet.

Total expenditure by the Department since Confederation \$25,714.13.

THORNBURY.

Thornbury is situated at the mouth of Beaver River, which empties into Georgian Bay, in the County of Grey, thirteen miles from Collingwood.

Some years ago a pier was constructed by the residents of the locality, but it was allowed to fall out of repair and become useless.

During the Session of 1881, the sum of \$7,000 was voted by Parliament to reconstruct the pier and dredge a basin 100 feet in width to 10 feet in depth, on its eastern side. This grant was supplemented by the sum of \$7,000, furnished by the Town of Thornbury, and the work was placed under contract. At the close of the fiscal year, 30th June, 1882, about one-fifth of the work had been completed.

Total expenditure by this Department since Confederation, \$3,469.98.

COLLINGWOOD.

Collingwood is situated on Nottawasaga Bay, on the southern shore of the Georgian Bay, and is an important town on account of its being the terminus of the Northern and Hamilton and North-Western Railways. It is ninety-four miles from Toronto, and there is an extensive trade in grain and lumber.

Prior to Confederation, a pier and lighthouse was erected here; but it was completely swept away by a storm in 1872.

In August, 1873, the work of re-construction was commenced and was completed in 1874, at a cost of \$57,468.43, one-half of which was paid by the Department, one-quarter by the Northern Railway Company, and one-quarter by the Town of Collingwood.

The works consist of a breakwater and pier head 700 feet in length, and a lighthouse. The work is of unusual strength. The front wall is built double up to water line, commencing 24 feet at the base; the cribs recede to 19 feet 6 inches at water-line, the point where the slope commences, to 5 feet below water line, and the angle is protected by boiler plate. The portion above water is carried up to the height of six feet, terminating at 12 feet 6 inches in width. Each angle is protected by boiler plate, three-eighths of an inch thick, spiked down by 12½ inch spikes. There are, therefore, three ranges of iron on the point. A centre wall of 12 inch square timber is carried up perpendicular to the top throughout the whole structure. The eastern or deep water end, finishes in a broad pier head 60 feet long by 80 feet wide, on which a lighthouse has been erected. This pier head as well as the body of the breakwater, is covered with three inch white oak plank.

The depth of water in the harbour was 11 feet; but as the size of the vessels navigating Lake Superior has increased, this depth was found insufficient, and during the seasons of 1879, and following years, dredging was commenced for the purpose of increasing the depth to 14 feet at low water.

Total expenditure by the Department since Confederation, \$84,636.32.

PENETANGUISHENE.

Penetanguishene is situated on the north of the eastern peninsula in Georgian Bay, formed between Nottawassaga Bay and the waters of the Severn.

During the summer of 1880, dredging was done at the western point, south of the Reformatory wharf, and to the north of the wharves at the village so as to give a depth of 16 feet in the channel.

Total expenditure by the Department since Confederation, \$2,624.07.

BRUCE MINES.

Bruce mines is situated on the northern shore of Lake Huron, in the County of Algoma, forth-five miles below Sault Ste Marie.

Between July and September, 1881, a channel with 14 feet of water was dredged to the public wharf.

Total expenditure by the Department since Confederation \$1,581.33.

LITTLE CURRENT.

Little Current is the passage between Cloche Island and the Great Manitoulin Island, and is on the direct route to Sault Ste. Marie from ports on the Georgian Bay. It is about 140 miles from Collingwood.

Owing to the existence of a rocky ledge the navigable channel was much narrowed and intricate of navigation, so much so that deeply laden vessels were obliged to make the outside passage through Lake Huron, which in the fall of the year is attended with much danger.

In May, 1881, the work of removing the rocky ledge in the channel was commenced, and during the season 3,752 cubic yards were blasted and removed. This rock was deposited between Manitoulin and Spider Islands and has had the effect of reducing the current in the steamboat channel; the water which formerly flowed between these islands now runs to the north-east of Spider Island where the channel is wide and deep.

About 10,000 yards of rock remain to be removed from the Channel of Little Current, and when the removal is completed there will be a depth of 17 feet in the channel.

Total expenditure by the Department since Confederation, \$12,415.25.

NEEBISH RAPIDS.

The Neebish Rapids are in Algoma County, at the foot of Lake George, twenty-four miles from Sault Ste. Marie, and midway between Bruce Mines and the Sault.

The rapids are caused by an outcrop of rock and boulders, and previous to any improvements being made their navigation was considered very dangerous.

In July, 1876, work was commenced here with a view to making a channel 200 feet wide with a depth of $14\frac{1}{2}$ feet throughout the length of the rapids, 1,600 feet, and the work has since been continued annually.

An examination of these rapids was made in 1880, when it was discovered that the best and most easily improved channel is on the American side of the river. In 1881 the American Engineers examined this channel, the result being that they placed an ordinary dredge at work, and for less than \$10,000 procured a depth of over 16 feet through obstructions consisting entirely of gravel and small stone. No further expenditure at this place will be requisite on the part of the Dominion, and it is probable that in a few years this channel may be abandoned for the more direct one through Hay Lake.

Total expenditure by the Department since Confederation, \$36,171.85.

SAULT STE. MARIE.

Sault Ste. Marie is the County Town of the County of Algoma, and is on St. Mary's Strait, 350 miles north-west of Collingwood.

In 1879, dredging was done at the wharf, to permit steamers drawing 10 feet to come up to it.

Total expenditure by the Department since Confederation, \$419.01.

RIVER KAMINISTIGUIA.

The Kaministiquia River empties into Thunder Bay.

In the bay, a shoal 4,000 feet in width extends from the mouth of the river, and in 1876, &c., a channel 44 feet in width, for 800 and 1,000 feet, respectively, at each end, and 22 feet wide over the central portion was cut through it to a depth of 13 feet; but, as might be expected, it has filled up to a certain extent, as the soundings taken in 1880 showed a depth of only 9 feet. In the river a width of 50 feet to the same depth was cut through the shallow water below the Hudson Bay Fort, and a through cut of 22 feet was made on the shoal, 800 feet long, opposite the mill; a second cut at this spot was left incomplete, about 300 feet in the centre not having been dredged.

Total expenditure by the Department since Confederation, \$18,881.82, of which \$12,882.57 are charged to Pacific Railway.

PROVINCE OF MANITOBA.

ASSINIBOINE RIVER.

The Assiniboine is a tributary of the Red River into which it flows at the City of Winnipeg. It is a shallow river, but is navigable by vessels of very light draught as far as Fort Ellice.

In 1880 a number of boulders, which obstructed navigation, were removed; and two wing dams, 240 and 215 feet in length respectively, were built on the south side of the river at Silver Heights five and a half miles from Winnipeg.

Total amount expended by the Department since Confederation, \$4,178.13.

RED RIVER.

The Red River rises in the western portion of the State of Minnesota, and after a course of about 525 miles crosses the boundary into Manitoba at Emerson, and follows a very tortuous course of about 140 miles, finally discharging into Lake

Winnipeg. It is navigable for vessels of light draught for the whole of its course through Manitoba and for a portion of its course through the United States.

Near the town of St. Andrews there are some rapids which were partly obstructed by several large boulders, to the serious interference with navigation. These boulders were removed during the seasons of 1873 and 1874, and other improvements made to the navigation of the river.

Total expenditure since Confederation, \$6,234.90.

PROVINCE OF BRITISH COLUMBIA.

COWICHAN RIVER.

The Cowichan River and Lake are on Vancouver Island, about thirty-five miles from Victoria.

The lake is about twenty-two miles long and twenty-two miles from the mouth of the river, which latter is for nearly half its course very rapid. The upper portion of the river and the shores of the lake are covered with magnificent timber and extensive lumbering operations are carried on. The channel of the river was very seriously obstructed by drift piles of fallen timber, and in June, 1878, a contract was entered into for removing these obstructions so as to permit of the free passage of logs.

Total expenditure by the Department since Confederation, \$1,469.84.

COURTENAY RIVER.

The Courtenay, or Comox River, is situated on Vancouver Island, 129 miles from Victoria.

The channel of the river is obstructed by snags, and in November, 1881, an attempt was made to remove these obstructions, but without success, the shallowness of the channel, only eight feet at high water, its crookedness and the strong current preventing the steamer from towing the fallen timber, which constitutes the obstructions, out to sea, as had been intended. Hon. Mr. Trutch, Government Agent in British Columbia, who personally superintended the operations, expresses the opinion that any further attempt would be equally futile.

Total expenditure by the Department since Confederation, \$474.65.

FRASER RIVER.

The Fraser is the most important river in British Columbia, flowing entirely through that Province. Its main branch rises in the Rocky Mountains, and it is fed by many tributaries, some of them very large. It was discovered by Sir Alexander McKenzie, in 1793, and by him named the Ta-cout-she Lesse, or River of the Tacully Nation. It was subsequently, in 1808, navigated to its mouth by Mr. Simon Fraser, from whom it takes its present name. The Towns of New Westminster and Yale are situated on the river, and it is navigable for steamers up to the latter place, about 25 miles from its mouth.

Port Sister Rock.—This rock, which was situated between Hope and Yale, four miles from the former and eleven from the latter, was a serious hindrance to navigation, and was removed in 1872-73 so as to leave a depth of from 10 to 12 feet at high water.

Saw Mill Rifle Rock.—This rock was removed in 1873, at a cost of \$700.

Survey.—In 1874 a very full survey of the river between Big Bar and Soda Creek, a distance of 120 miles, was made with a view to its improvement for navigation, and an estimate made of the probable cost, amounting to \$100,000, without taking into account the obstructions at Big Bar Canyon.

Cottonwood Canyon, on the Upper Fraser, is situated about twenty miles north of Quesnelle mouth, and its navigation is obstructed by numerous rocks and boulders. The Canyon is about 500 yards long, and it is estimated that if its channel was cleared, the Fraser would be rendered navigable for an additional distance of sixty miles, thus giving a navigable stretch of 140 miles from Soda Creek and eighty miles from Quesnelle mouth. At the Session of 1879 the sum of \$10,000 was voted for improving the navigation of this section, and in October the work of blasting was commenced and prosecuted until the Canyon was closed by ice, at which time 564 cubic yards had been blasted at a cost of \$9,997, of which about \$3,250 was expended for plant, making the cost of blasting, exclusive of plant, about \$12 per cubic yard. Mr. Pearce, the Resident Engineer, in his Report, dated 8th March, 1880, estimates that 2,227 cubic yards of rock remain to be blasted in order to give a channel available for light draught steamers at low water; and that the cost of removal would be \$21,420. No further work has been done.

Dredging.—The main impediments to navigation from the Straits of Georgia to New Westminster consist in the tortuousness and shallowness of the channel through the sands at the mouth of the Fraser, and in the changes which it undergoes after each year's freshet. During the summer of 1880 dredging operations were carried on at the Woodward Slough, and a channel opened 2,000 feet long by 250 feet wide, having a depth of water at the lowest tide of 13 feet in the shallowest places, and at ordinary high tide 21 feet. This new channel reduces the distance between New Westminster and the mouth of the Fraser by about two miles.

Total expenditure by the Department on Fraser River improvements since Confederation, \$29,566.22.

NAAS RIVER.

The Naas River rises near the frontier of Alaska and flows south into the Skeena.

The channel of the river being greatly obstructed by snags, navigation is thereby rendered both difficult and dangerous. An appropriation was made for the purpose of removing these obstructions and the work entrusted to Captain H. E. Croasdaile, a resident of Naas River, who reports, under date of 18th November, 1881, that most of the snags had been removed and a channel buoyed, and that "for the first time in its history the ordinary coasting steamers have been making trips up it for some fourteen miles, from April to October, and have only touched snags on one or two occasions. A further appropriation to continue the work has been made, but no report had been received from Captain Croasdaile up to the close of the fiscal year.

Total amount expended by the Department since Confederation, \$990.84.

SKEENA RIVER.

The Skeena, or Simpson River, rises in Lake Connolly, on the Peak Mountains, and runs westward into the Pacific at the head of Observatory Inlet, forming for a portion of its course the boundary between Alaska and British Columbia. It is navigable for about 100 miles for light draught steamers, and has several extensive salmon canneries on its banks. The channel is, however, greatly obstructed by snags, in the shape of fallen trees, which have become imbedded in the sand, and an appropriation of \$1,500 has been made for the purpose of removing these obstructions, and the performance of the work entrusted to Mr. J. H. Turner, but up to the close of the fiscal year, 1882, no report had been received from him.

VICTORIA HARBOR.

Victoria, the capital of British Columbia, is situated at the south-eastern extremity of Vancouver Island, and is the political and commercial centre of the British possessions on the Pacific coast.

The harbor is difficult of access, shallow, and is obstructed by several rocks. It is only divided by a narrow strip of land from Esquimault, the finest harbor on the Pacific north of San Francisco, and it seems somewhat singular that Esquimault, which is the chief station of the British squadron in the Pacific, should not have been selected as the capital instead of Victoria.

Under the "Victoria Harbor Act," passed by the Provincial Government in 1860, a commission was appointed to make a thorough examination of the harbor, and to make suggestions as to its improvement. This commission reported on 28th February, 1862, to the effect that vessels of 15 feet draught could only enter at high water, (tides rise 10 feet), and recommended that the bar at the entrance and the channel should be dredged so as to give 14 feet at low water, for which purpose they suggest that a dredge and steamer should be purchased. Acting on this report the Provincial Government in 1863 purchased in England the machinery for a dredge and punts and the engines for a steam tug. The hulls were built in Victoria, and, in 1864, the dredge and the steamer "Sir James Douglas" were finished at a cost of about \$92,000. The working of the dredge, however, proved unsatisfactory, and on 14th June, 1865, in consequence of a resolution passed by the House of Assembly, the superintendent and all the crew were paid off and the dredge laid up. The "Sir James Douglas" was shortly after employed on postal service, and no further steps seem to have been taken with reference to dredging the harbor.

On the entry of British Columbia into the Union, the dredging plant and steamer "Sir James Douglas" were transferred to the Dominion Government; and, in 1872, dredging operations were commenced, and have, with some interruptions, been continued ever since. At first a tug was hired at \$400 per month, but, in 1874, the tug "Georgia" was purchased, and has since been used in dredging. Up to the close of the fiscal year, 1880, a total quantity of 117,633 cubic yards of material had been removed, at a total cost of \$80,661.91, of which \$32,374.53, was for vessels, machinery, etc. Of the result attained Mr. Pearse, in his Report dated 12th January, 1880, says:—"In 1859, the water at the entrance to the harbor would only admit of the entrance of vessels drawing 18 feet at extreme high water springs. Now vessels having that draught, can get in at half tide; and vessels drawing 21 to 22 feet, can enter at high water springs. In 1859, the entrance at the Spit was only 390 feet wide, it is now 590 feet. It was formerly very tortuous, and for this reason, long ships found it extremely difficult, even in fair weather, to make the sharp turn necessary at the Spit. It is now a comparatively straight course." He further estimates that in order to get a depth of 14 feet at low water spring tides over the bar and as far as the wharves (which would be equal to 24 feet at high water), would require additional dredging to the amount of \$62,042.65. During 1880, the dredge and tug were mouth of the employed at the Fraser, wintering in the Coquitten River, and only resuming work in Victoria Harbor, on 19th January, 1882, when some dredging was done in front of the wharves, and work afterwards resumed at the Spit off Shoal Point, where she was still engaged at the close of the fiscal year, 1882.

Beaver Rock.—One of the greatest obstructions in Victoria Harbor was the Beaver Rock, which was about 100 feet in length by 60 feet broad, and was only about 3 feet below low water spring tides. It was directly in the way of vessels going to their berths, and many grounded on it. On 12th April, 1875, a contract was entered into with Mr. Thomas Spence for its removal for the sum of \$11,950. Mr. Spence succeeded in blasting the rock, but was somewhat slow in removing the material, and, on 17th May, 1881, the work was taken out of his hands and completed under the direction of Hon. Mr. Trutch, Government Agent. In his Report, dated 1st November, 1882, Mr. Trutch says:—

"This important work was brought to a conclusion on the 22nd August, 1881, and after a careful survey had been made by which it was determined that there were no projecting points of rock within 12 feet 6 inches of low water, level of spring tides. The barges, caisson and other plant were removed and stored. There is now a depth of 12 feet 6 inches of water at low water, spring tides, over the whole site of the rock."

Total expenditure by the Department in Victoria Harbor since Confederation, viz. :—

Removal of <i>Beaver Rock</i>	\$ 7,334.85
Dredging.....	76,395.01
	<u>\$83,779.86</u>

LIGHTHOUSES, ROADS AND BRIDGES, DAWSON ROAD (RED RIVER ROUTE), ST. FRANCES LOCK.

For report on lighthouses, roads and bridges, Dawson Road (Red River Route), St. Frances Lock, see Appendix No. 20.

SURVEYS.

Surveys have been made at the following places, and reports and estimates of the cost of improvements submitted :—

PROVINCE OF NOVA SCOTIA.

ANNAPOLIS COUNTY.

Anderson's Cove	Lower Granville
Annapolis (for bridge)	Parker's Cove

CAPE BRETON COUNTY.

Beaver Cove	False Bay Beach
Campbell's Harbour	Gabarus River
Catalogue Gut	Grand Narrows, or Barra Strait
Christmas Island	Little Bras d'Or
East Bay	Open Pond

COLCHESTER COUNTY.

Forbes Landing (Old Barns)	Truro
Great Village River	

CUMBERLAND COUNTY.

Advocate Harbour	Ram's Head River
Apple River	Spencer's Island
Diligence Harbour	Three Sisters
Lower Cove	West Bay
Port Greville	

DIGBY COUNTY.

Bear River	Gulliver's Hole
Church Point	Tiverton
Freeport	Westport
Gilbert's Cove	West Sandy Cove
Grossecouque	

GUYSBORO' COUNTY.

Anderson's Creek	Indian Harbour
Barachois	New Harbour
Brennan's Cove	Salmon River
Clam Pond	St. Francis Harbour (Goose Pond)
Cooks' Cove	St. Mary's River
Fox Island	Wine Harbour

HALIFAX COUNTY.

Jeddore Harbour	Porter's Lake (for canal)
Peggy's Cove	

HANTS COUNTY.

Cheverie	Noel Bay
Hantsport	Walton

INVERNESS COUNTY.

Long Point	Port Hawkesbury
Port Hastings	Smith's Island, Port Hood

KINGS COUNTY.

Baxter's Harbour	Long Beach
Bennet's Cove	Ross' Creek, Cornwallis
Black Rock	Wells' Cove
Hall's Harbour	Wolfville
Little Clam Cove	

LUNENBURG COUNTY.

Petite Rivière	Port Medway Island
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PICTOU COUNTY.

Cameron's Cove	Caribou (Big Island)
Cape John Cove	MacDonald's Cove

QUEEN'S COUNTY.

Bell's Point, Port Mouton	Port Mouton
Coffin's Island	Western Head
Eagle Head	White Point
Hunts' Point	Willow Cove
Port Joli	

RICHMOND COUNTY.

Birch Island	Grand River
Cap la Ronde	Haul-over, Ile Madame
Fourché	River Bourgeois
Grand Goulet	

SHELBURNE COUNTY.

Cape Negro Island	Louis' Head Harbor
Cape Sable Island	Port l'Hebert
Cat Point	Shelburne
Jones' Harbor	Stony Island

VICTORIA COUNTY.

Aspey Bay	Neil's Harbor
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YARMOUTH COUNTY.

Abram's River	Pubnico
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PROVINCE OF PRINCE EDWARD ISLAND.

Bedeque Harbour,	Prince County.
Brae River,	do
Cape Traverse,	do
Cascumpec Harbour,	do
Egmont Bay,	do
Fifteen Point,	do
Kildare,	do
Nail Pond,	do
Skinner's Pond	do
Traverse Cove,	do
West Pond,	do
Bell Creek,	Queen's County.
Cove Head Harbour,	do
French River,	do
South-west River,	do
Tracadie Harbour,	do
Tryon Harbour,	do
Savage Harbour,	King's County.
Souris West,	do

PROVINCE OF NEW BRUNSWICK.

ALBERT COUNTY.

Anderson's Hollow.

Hopewell.

CHARLOTTE COUNTY.

On Island of Grand Manan.:

- | | |
|---------------------|------------------|
| 1. Dark Harbour. | |
| 2. Flag Cove. | Beaver Harbour. |
| 3. Gull Cove. | Lepreau. |
| 4. Seal Cove. | River St. Croix. |
| 5. Whale Cove. | |
| 6. Woodward's Cove. | |

GLOUCESTER COUNTY.

Caraquet.	Tracadie.
Pokeshaw.	

KENT COUNTY.

Kouchibouguac Harbour.

NORTHUMBERLAND COUNTY.

Mirimachi River below Newcastle.

QUEEN'S COUNTY.

Grinross Canal.	Salmon River.
Newcastle Creek.	

RESTIGOUCHE COUNTY.

Campbellton Harbour.	CrossPoint and Campbellton Ferry
Charlo.	River Restigouche.

ST. JOHN COUNTY.

Irishtown Cove.

VICTORIA COUNTY.

International Bridges across the St. John River.
 Several sites have been surveyed between St. Francis and the Grand Falls.

WESTMORELAND COUNTY.

Cape Tormentine (Interprovincial Ferry.)
 Moncton (Hall's Creek Dock.)

PROVINCE OF QUEBEC.

1867, 1868, 1869, 1870.

Amherst Harbour,	Magdalen Islands,	Gaspe County.
House Harbour,	do	do
Cape Tormentine,	River St. Lawrence,	Charlevoix County.

1870, 1871, 1872, 1873.

Rimouski,	River St. Lawrence,	Rimouski County.
Chute à Blondeau,	Ottawa River,	Argenteuil County.
	2,9	

1873, 1874, 1875, 1876.

River Blanche,	River St. Lawrence,	Rimouski County.
River du Loup (<i>en bas</i>),	do	Temiscouata County.
River Ouelle,	do	Kamouraska County.
L'Islet,	do	L'Islet County.
Grosse Isle,	do	Montmagny County.
Berthier,	do	Bellechasse County.

1876, 1877.

Bic,	River St. Lawrence,	Rimouski County.
Trois Pistoles,	do	Temiscouata County.

1877, 1878.

Matane,	River St. Lawrence,	Rimouski County.
Bic,	do	do
St. Jean Port Joli,	do	L'Islet County.

1878, 1879.

Ste. Anne du Saguenay,	River Saguenay,	Chicoutimi County.
L'Islet,	River St. Lawrence,	L'Islet County.
St. Thomas,	do	Montmagny County.
Chenal du Moine,	do	Richelieu County.

1879, 1880.

House Harbour,	Magdalen Islands,	Gaspé County.
Etang du Nord,	do	do
Etang des Caps,	do	do
Amherst Harbour,	do	do
Bassin Bay,	do	do
Cape Cove,	do	do
Percé,	do	do
Grand Pabos,	Bay of Chaleurs,	do
Caplan,	do	do
New Richmond,	do	Bonaventure County.
Carleton,	do	do
Rimouski,	River St. Lawrence,	Rimouski County.
River du Loup (<i>en bas</i>),	do	Temiscouata County.
St. Irénée,	do	Charlevoix County.
St. Roch des Aulnaies,	do	L'Islet County.
St. François de l'Île,	do	Montmorency County.
Ste. Famille de l'Île,	do	do
River Nicolet,		Nicolet County.
Rivière à la Graisse,	Rigaud,	Vaudreuil County.

1880, 1881.

L'Anse à l'Eau,	River Saguenay,	Saguenay County.
L'Anse du Portage,	do	do
Matane,	River St. Lawrence,	Rimouski County.
Cap à l'Aigle,	do	Charlevoix County.
Isle aux Coudres,	do	do
Bay St. Paul,	do	do
Les Ecureuils,	do	Portneuf County.
St. Pierre les Becquets,	do	Nicolet County.

River du Loup (<i>en haut</i>),		Maskinongé County.
River St. Francis,		Yamaska County.
River Yamaska,		do
St. Ours,	River Richelieu,	Richelieu County.
St. Denis,	do	St. Hyacinthe County.
St. Hilaire,	do	Rouville County.
Cedars,	River St. Lawrence,	Soulanges County.
St. Zotique,	Lake St. Francis,	do
Lake Temiscamingue,	Upper Ottawa.	

1881, 1882.

Barachois de Malbaie,	Bay of Chaleurs,	Gaspé County.
Percé,	do	do
Caplan,	do	do
Port Daniel,	do	do
Escoumains,	River St. Lawrence,	Saguenay County.
Grande Décharge,	Lake St. John,	Chicoutimi County.
Port au Saumon,	River St. Lawrence,	Charlevoix County.
The Traverse,	do	
St. Jean Port Joli,	do	L'Islet County.
St. François de l'Île.	do	Montmorency County.
St. Michel,	do	Bellechasse County.
Pointe aux Trembles,	do	Portneuf County.
Three Rivers,	do	Three Rivers County.
River St. Francis,		Yamaska County.
Bacot Hayes Shoal,	River St. Lawrence,	
Upper River Ottawa.		

 PROVINCE OF ONTARIO.

1867, 1868.

Murray Canal,		Prince Edward County.
Port Dover,	Lake Erie,	Norfolk County.
Dawson Road,		Algoma County.

1868, 1869, 1870.

Grenville Dam,	River Ottawa,	Prescott County.
Long Point (Port Rowan),	Lake Erie,	Norfolk County.
Port Burwell,	do	Elgin County.
Port Stanley,	do	do
Rondeau,	do	Kent County.
Two Creeks,	do	Essex County.
Bayfield,	Lake Huron,	Huron County.
Goderich,	do	do
Kincardine,	do	Bruce County.
Inverhuron,	do	do
Port Elgin,	do	do
Saugeen or Southampton,	do	do
Chantry Island,	do	

1872, 1873, 1874.

Kingston,	Lake Ontario,	Frontenac County.
Pictou,	Bay of Quinté,	Prince Edward County.
Napanee,	do	Lennox County.
Salmon River,	do	Hastings County.
Belleville,	do	do
Presqu'Île,	Lake Ontario,	Prince Edward County.
Cobourg,	do	Northumberland County.
Port Hope,	do	Hastings County.
Port Stanley,	Lake Erie,	Elgin County.
Kingsville,	do	Essex County.
Chenal Ecarté,	Lake St. Clair.	Kent County.
Sarnia,	River St. Clair,	Lambton County.
Bayfield,	Lake Huron,	Huron County.
Port Albert,	do	do
Kincardine,	do	Bruce County.
Inverhuron,	do	do
Owen Sound,	Georgian Bay,	Grey County.
Meaford,	do	do
Thornbury,	do	do

1874, 1875.

Port Hope,	Lake Ontario,	Hastings County.
Port Darlington,	do	Durham County.
Oshawa,	do	Ontario County.
Whitby,	do	do
Pickering,	do	do
Toronto,	do	York County.
Port Burwell,	Lake Erie,	Elgin County.
River Detroit,		Essex County.
River Sydenham (East Branch),		Bothwell County.
Port Franks,	Lake Huron,	Huron County.
Port Elgin,	do	Bruce County.

1875, 1876.

Napanee,	Bay of Quinté,	Lennox County.
Trenton,	do	Northumberland County.
Nigger Island,	do	Hastings County.
Belleville,	do	do
Morpeth,	Lake Erie,	Bothwell County.
Eagle,	do	Essex County.
River Detroit (Tunnel).		

1876, 1877.

Nigger Island,	Bay of Quinté,	Hastings County.
Newcastle,	Lake Ontario,	Durham County.
Toronto,	do	York County.
Oakville,	do	Halton County.
Niagara River,		Welland County.
Rondeau,	Lake Erie,	Kent County.
River Sydenham (North Branch),		Lambton County.
Parry Sound,	Georgian Bay,	Muskoka County.
Neebish Rapids,		Algoma County.
River Kaministiquia,		do

1877, 1878.

Burlington Piers,	Lake Ontario,	Wentworth County.
Port Stanley,	Lake Erie,	Elgin County.
Owen Sound,	Georgian Bay,	Grey County.
Meaford,	do	do
Collingwood,	do	Simcoe County.
Prince Arthur's Landing,	Lake Superior,	Algoma County.

1878, 1879.

Black Creek,	South Bay,	Prince Edward County.
Weller's Bay,	Lake Ontario,	do
Port Albert,	Lake Huron,	Huron County.
Kincardine,	do	Bruce County.
Thornbury,	Georgian Bay,	Grey County.
Penetanguishene,	do	Simcoe County.

1879, 1880.

Toronto,	Lake Ontario,	York County.
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1880, 1881.

Portsmouth Harbour,	Lake Ontario,	Frontenac County.
Belleville,	Bay of Quinté,	Hastings County.
River Moira,	do	do
Presqu'île to Bay of Quinté,		Prince Edward County.
Whitby,	Lake Ontario,	Ontario County.
Pigeon Bay,	Lake Erie,	Essex County.
Pelée Island,	do	do
River Thames,	Lake St. Clair,	do
Point Edward,	River St. Clair,	Lambton County.
Goderich,	Lake Huron,	Huron County.
Kincardine,	do	Bruce County.
Southampton,	do	do
Warton,	Georgian Bay,	do
Meaford,	do	Grey County.
Collingwood,	do	Simcoe County.
Little Current,		Algoma County.
Neebish Rapids,		do
River Kaministiquia,		do
Prince Arthur's Landing,	Lake Superior,	do

1881, 1882.

Kingston,	Lake Ontario,	Frontenac County.
Wellington,	do	Prince Edward County.
Newcastle,	do	Durham County.
The Narrows between Lakes Simcoe and Couchiching.		
Kingsville,	Lake Erie,	Essex County.
Sarnia,	River St. Clair,	Lambton County.
Bayfield,	Lake Huron,	Huron County.
Goderich,	do	do
Port Albert,	do	Bruce County.
Kincardine,	do	do
Southampton,	do	do
River au Sable,	do	do
Tobermory,	do	do
Warton,	Georgian Bay,	do
Collingwood,	do	Simcoe County.

PROVINCE OF MANITOBA.

1873, 1874

1881, 1882.

Red River, near St. Andrews.

Lake Manitoba.

PROVINCE OF BRITISH COLUMBIA.

1874.

Fraser River.

1880, 1881.

Beaver Rock,

Skeena River,

Naas River.

HENRY F. PERLEY,
Chief Engineer.

PROVINCE OF QUEBEC.

Names of Places.	Counties.	Total Length	Width.	Height at end.	Block.		Depth of Water at end.		Date of Commencement of Work.	Remarks.
					Length.	Width.	E. L. W.	E. H. W.		
		Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.		
Etang du Nord, Magdalen Islands..... New Carlisle.....	Gaspé..... Bonaventure.....	225	28	22	.....	.....	12	15	1881	This work is still in progress. Work in progress; Municipality supplemented Parliamentary grant with \$2,500 towards the work.
		500	25	.....	50	25	.....	.....	1881	
Carleton.....	do	225	20	17	90	20	4½	12½	1881	This work is still in progress; Municipality made a grant of \$2,500 towards its construction.
Matane.....	Rimouski.....	480	30	20	.....	.....	1½	15½	1878	This wharf consists of 10 cribs, with spaces of 25 feet between them. To prevent the shifting of sand, the spaces have been closed up in 1881 with piles driven across them.
Rivière Blanche.....	do	210	20	20	150	30	2	16	1876	The block was completed in 1880. It is to be connected to the shore; the distance thereof being 655 feet, 180 feet of which were built in 1882.
Rimouski.....	do	2,500	20	25	150	30	8·0	28·0	1853	This pier is kept in good repairs by the Inter-colonial Railway.
Trois-Pistoles.....	Temiscouata.....	980	30	.....	.....	.....	.....	.....	1881	Work in progress. Dimensions to be as given when pier is completed.
Rivière du Loup.....	do	1,641	30	42	124	50½	14	34	1852	Since 1877 the superstructure has been partially rebuilt and the pier raised 2 feet. Water has become shoal by the deposit of sand since 1867.
Anse du Portage.....	Chicoutimi	108	18	28	Slip.	24	4	21	.....	Built in 1882.
Anse St. Jean.....	do	366	26	29	104	40	7½	24½	.....	Built in 1875-76-77 by Provincial Government and Municipality. Since 1879, the works have been continued by the Dominion Government.
St. Alphonse de Bagotville.....	do	445	24	49	77	55	29	47	1860	Built by Municipality in 1863; burnt in 1865; rebuilt by Government in 1875. This pier is being extended; the works are in progress.
Chicoutimi.....	do	282	30	28	127	34	71	19	1873	Built in 1873 by the St. Lawrence Steam Co. In 1874, the Government took possession of it and made repairs in 1880-81-82.

GOVERNMENT PIERS AND WHARFS—Continued.

PROVINCE OF QUEBEC—Continued.

Names of Places.	Countries.	Total Length.	Width.	Height at end.	Block.		Depth of Water at end.		Date of Commencement of Work.	Remarks.
					Length.	Width.	E. L. W.	E. H. W.		
		Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.		
RivièreOuelle, Pointe aux Orignaux.....	Kamouraska.....	1,219	28	42	237½	51	14	32	1852	Complete in 1856. This pier has been raised 2 feet within the last 3 years. Lighthouse at end of pier.
Malbaie, Cap à l'Aigle.....	Charlevoix.....	158	35	42½	.....	.....	18	37	1880	Work finished in 1881.
Malbaie, Pointe au Pic.....	do.....	500	30	46	108	70	24	44	1850	Completed in 1854.
Eboulement.....	do.....	900	30½	36	80	45	15	34	1852	Work completed in 1853.
Baie St. Paul, Cap.....	.....	850	30	36	.....	.....	12	31	1881	Work in progress. Dimensions to be as given when work is completed.
do aux Corbeaux.....	.....	200	30	.....	.....	.....	12	31½	1874	Lighthouse on block.
Baie St. Paul, Block.....	Charlevoix.....	263	32	42	.....	.....	16½	38	1881	Built with the grant by the inhabitants.
Isle aux Coudres.....	do.....	332	20	24	.....	.....	5	22	1875	A block 30 x 30 was built by the inhabitants. The remainder was built by the Government and completed in 1881.
St. Jean Port Joli.....	L'Islet.....	1104	31	34	48	51	7½	25½	1852	Completed in 1855. The whole superstructure was rebuilt in 1876-7-8.
L'Islet.....	do.....	225	25	32	75	36	6	24	1882	Work completed.
Isle aux Grues.....	Montmagny.....	345	25	36	84	50	10	31	.....	Completed in 1866. An addition was built in '82.
Grosse Isle, East Wharf.....	do.....	345	48	.....	.....	.....	.....	.....	.....	Completed in 1848.
Isle West do.....	do.....	100	25	19	.....	.....	.....	25	1879	Commenced in 1879 and completed in 1882.
St. Thomas.....	do.....	466	32	34	59	27	12	30	1852	Completed in 1853. This pier was repaired in 1877-78.
Berthier (en bas).....	Bellechasse.....	1,081	30	27	50	37	6	22	.....	Built by Municipality by means of Municipal Loan Fund.
St. Michel.....	do.....	460	30 & 25	24	90	30	.....	20	1882	Work not completed.
St. François de l'Île Ste. Famille.....	Montmorency.....	651	30	.....	50	44	7	23	1879	There are 6½ feet at half neap and 8½ at half spring tides. This pier was completed at the end of the fiscal year 1881-82.
St. Jean.....	do.....	.....	.....	.....	.....	.....	.....	.....	.....	Lighthouse at the end of this wharf. This wharf was built by the Municipality, and is owned by a Company. The Government having built a lighthouse on it, the Depart-

City or Town	Port	583	20	16	104	32	7	23	1881	Remarks
Berthier (<i>en haut</i>)	Portneuf	583	20	16	104	32	7	23	1881	Lighthouse at the end of this wharf. Dry at low water. There are, at high water (neaps), 7 feet of water, at high water (spring), 12 feet of water. It was built in 1881. A wharf.
Agnes, Lake Mégantic	Berthier	.....	.....	.....	186	65	10	.....	.....	.....
Popolis	Compton	435	30	13	80	23	6	11	1882	This pier was built in the fall of 1882. On Lake Mégantic. Pier built in 1882.
Lavaltrie	do	165	12	13	20	20	6	11	1882	.....
L'Assomption	Berthier	183	20	17	54	33	10	.....	.....	.....
St. Sulpice	Assomption	101	69	.....	.....	.....	.....	.....	.....	.....
Cascades Pier	do	195	20	18	54	33	10	.....	.....	.....
St. Timothy	Soulanges	.....	.....	.....	70	20	.....	.....	1886	.....
.....	Beauharnois	.....	.....	.....	100	24	7½	11½	.....	A stone embankment was built from the shore to the wharf; the length being 150 feet, and width, 24 feet, when completed. This landing pier was rebuilt in 1882.
Cedar	Soulanges	.....	.....	.....	115	24	7½	11½	.....	This landing pier was rebuilt in 1881.
St. Dominique	do	64	24	.....	73	24	15	19	.....	This landing pier was rebuilt in 1880.
Coteau Landing	do	104	20	.....	249	24	13	17	.....	A road from the King's Highway to the Wharf has been made by the R. and O. Navigation Co.; its length is 800 feet.
St. Zofique	do	220	20	.....	100	24	9	13	1882	Work in progress. The proposed pier will have a length of 1,150 feet, 220 feet were built in 1882.
St. Anicet	Huntingdon	300	34 & 18	.....	.....	.....	.....	.....	1882	On the south shore of Lake St. Francis.

GOVERNMENT PIERS AND WHARFS.

PROVINCE OF ONTARIO.

Names of Harbours.	Counties.	Lakes.	Length.		Revetment or Pilework.	Breakwater.	Total Wharfing.	Width.	Depth of Water at Entrance.		Expenditure by Government, Local Companies, Municipal Authority or Harbour Commissioners.	Remarks.
			North or East Pier.	South or West Pier.					E. L. W.	E. H. W.		
L'Orignal.....	Prescott.....	River Ottawa.	.....	.....	.....	.....	1,354	.....	.....	.....	Local Municipality and Government.	Completed in 1858.
Cobourg.....	West Northumberland.	Lake Ontario.	1,190	1,650	1,050	.....	3,890	30	12, E.P. 22, W.P.	16 26	Company, Town Council and Government.	The works were commenced in 1829; an extension of 200 ft. to the East Pier is under contract.
Port Hope.....	East Durham.	do	1,471	1,641	6,663	300	9,774	20-30	12	16½	Company, Commissioners and Government.	The works were commenced in 1832. The breakwater, 300 ft. in length, is under contract. The rebuilding of the piers and the pilwork will be let shortly.
Newcastle.....	West Durham.	do	880	600	730	.....	2,210	15-30	12	16½	.....	.....
Port Darlington.	do	do	1,180	1,620	.....	.....	2,800	20-30	12	16½	Company, Commissioners and Government.	.....
Oshawa.....	South Ontario.	do	.....	.....	.....	.....	815	20-30	11	11½	Company and Government.	.....
Whitby.....	do	do	390	645	1,760	.....	2,795	20-30	11	15½	Company and Government.	The works were commenced in 1843.
Pickering.....	do	do	685	835	.....	.....	1,460	15-30	12	16½	Township, Harbour Company and Government.	.....
Toronto (Queen's Wharf).....	York.....	do	.....	.....	.....	.....	1,091	30	12	16½	Government and Harbour Commissioners.	Queen's Wharf. The works were commenced in 1833.
Toronto Harbour Improvements.	do	do	.....	.....	13,130	.....	.....	11	.....	.....	Government.....	This work is under contract. Messrs. Cooke & Jones are the contractors. Operations were commenced on 1st Jan., 1883.
Oakville.....	Halton.....	do	646	500	422	.....	1,562	15-60	7	11½	Wm. Chisholm and Government.	The works were commenced in 1839.
Burlington Piers	Wentworth.....	do	2,307	2,710	.....	.....	5,017	20-40	14	18½	Government.....	The works were commenced in 1825. They are kept in repairs by the Department of Railways and Canals.

A. 1883									
Port Dover	South Norfolk.	do	1,020	1,020	2,040	10	13
Port Burwell.....	East Engin.....	do	570	850	1,100	2,520	15-30	9	12
Port Bruce.....	do	do	700	750	1,450
Port Stanley	do	do	1,150	1,870	720	3,740	20-30	11½	14½
Rondeau.....	Kent.....	do	830	1,080	2,060	3,863	30-40	18	21
Kingsville	South Essex....	do	880	440	750	2,070	20-50	12	15
Bayfield.....	South Huron....	Lake Huron ...	820	875	1,695	20-30	11	14½
Goderich.....	West Huron....	do	1,320	1,520	720	3,560	30	14	17½
Port Albert.....	do	do	290	120	410	20	5	8½
Kincardine.....	West Bruce	do	905	880	1,905	3,690	30	12	15½
Inverhuron	do	do	450	15-30	16	19½
Port Elgin. ...	do	do	380	600	980	20	12	15½
Southampton & Chantry Island	do	do	570	4180	4,750	20-30	14	17½
Warton.....	North Grey	Georgian Bay.	1,235	20	14	17½
Big Bay	do	do	452	14-25	11½	15
Owen Sound.....	do	do	2,470	2,470	20	14	17½
B. 1883									
C. 1883									
D. 1883									
E. 1883									
F. 1883									
G. 1883									
H. 1883									
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V. 1883									
W. 1883									
X. 1883									
Y. 1883									
Z. 1883									

GOVERNMENT PIERS AND WHARFS—Continued.
PROVINCE OF ONTARIO—Continued.

Names of Harbours.	Counties.	Lakes.	Length.		Revetment of Pilework.	Breakwater.	Total Wharfing.	Width.	Depth of Water at Entrance.		Expenditure by Government, Local Companies, Municipal Authority or Harbour Commissioners.	Remarks.
			North or East Pier.	South or West Pier.					E. L. W.	E. H. W.		
Meaford	East Grey	Georgian Bay.	775	feet.	feet.	feet.	feet.	feet.	feet.	feet.	17½	Municipal Council and Government. A portion of the pilework is under contract. The work of construction was commenced in 1886.
Thornbury	do	do ..	.....	.....	.....	.....	420	15-30	12	15½	15½	This pier is, at present time, being repaired.
Collingwood	North Simcoe.	do ..	.....	.....	.....	1390	.....	20-24	11	14½	14½	The breakwater, 790 feet in length, was built in 1874-75. An extension to the east pier, 600 feet in length, is under contract.
Prince Arthur's Landing.	Algoma	Lake Superior.	.....	.....	.....	.....	640	30	12	14	14	Cost included in the expenditure of the construction of the Dawson Road. It was built in 1870.

H. F. P.

APPENDIX No. 4.

REPORT ON HARBOURS

IN THE

MARITIME PROVINCES.

BY

G. F. BAILLAIRGE,

Formerly Assistant Chief Engineer, now Deputy of the
Minister of Public Works.

APPENDIX No. 4.

REPORT ON HARBOURS IN THE MARITIME PROVINCES.

By G. F. BAILLAIRGÉ.

No. 22969.

CEDARS, 15th May, 1872.

SIR,—In obedience to your instructions No. 11,055 of 4th July, 1871, I examined the various harbours of the Maritime Provinces where improvements had been applied for or were desirable, as shown by the references with which I had been furnished or otherwise.

The following preliminary Report is now submitted—showing the nature and probable cost of the projected improvements and whether they are of a Local or Federal character.

Plans with a more detailed Report can be furnished hereafter. The various references named in the present Report, are transmitted herewith together with references Nos. 3,885, of 29th June, 1868, 15,363, of 30th March, 1871, and 15,943 of 5th May, 1871. Also references:—

Nos. 9,630 of 6th March, 1871.

“ 9,755 “ 17th “ “

“ 9,756 “ 17th “ “

“ 9,971 of 8th April, 1871.

“ 10,042 “ 15th “ “

“ 10,157 “ 21th “ “

“ 10,182 “ 24th “ “

“ 10,193 “ 25th “ “

“ 10,213 “ 26th “ “

“ 10,215 “ 26th “ “

IN NEW BRUNSWICK.

BEAVER HARBOUR—CHARLOTTE COUNTY.

On the northern coast of the Bay of Fundy, forty-four miles below St. John.

Memorial No. 6,718 from inhabitants of parishes of Pennfield and St. George for a grant of \$4,000 towards building a breakwater, 14th May, 1869.

Surveyed in November and December, 1871, under my instructions by Alex. Munro, P.L.S.

Probable cost of breakwater for shelter of harbour.

Estimate : No. 1, 350 feet long, ending in $6\frac{1}{2}$ feet at low water, \$ 20,100

“ No. 2, 550 “ “ “ 29 “ “ “ 62,000

“ No. 3, 750 “ “ “ 29 “ “ “ 107,600

“ No. 1, would give very little shelter.

“ “ 2, would be a much better protection.

“ “ 3, is the most desirable.

The above may be considered as being of a Federal character.

See Report of Alex. Munro, P.L.S., appended hereto, with plan.

SHIPPAGAN GULLY, GLOUCESTER COUNTY.

On the eastern coast of New Brunswick, between Baie des Chaleurs and Gulf of St. Lawrence, midway between Shediac, Northumberland Strait and Campbellton, at the head of Baie des Chaleurs.

Gully down to Shediac.....	120 miles.
Gully across Baie des Chaleurs to Port Daniel.....	30 "
Gully up Baie des Chaleurs to Campbelltown.....	100 "

Dredging and breakwater required to a depth of 15 feet at low water.

Probable cost of projected works varies from \$310,718 to \$108,550, according to location and breadth of channel to be excavated.

For further details, see my Report of 22nd April, 1872, enclosing that of Mr. Rosa, who surveyed Gully under my instructions.

May be considered as a Federal work.

See Report of Joseph Rosa, C.E., appended hereto, with plan.

IN NOVA SCOTIA.

CAPE BRETON ISLAND.

NORTH-EAST COAST.—COUNTY OF VICTORIA.

From Cape North at the north eastern extremity of Cape Breton to St. Ann's Bay, there is not a single harbour where vessels can seek refuge.

Aspee Bay and Ingonish are the only localities where the requisite shelter might be obtained by means of dredging and breakwaters, for vessels of 17 feet draught at low water.

The north pond of Aspee Bay and the south pond of Ingonish South are the best sites for the projected works; the former is nine miles below Cape North, and fifty-two miles above St. Ann's Harbour; the latter is thirty-four miles below Cape North and twenty-seven above St. Ann's Harbour.

Aspee Bay would probably be of a more general benefit than Ingonish, but the latter would afford a better harbour at less cost than the former.

One or the other should be improved as a Federal harbour, if not each of them.

The fisheries along this part of the coast are paralysed for the want of a harbour.

ASPEE BAY NORTH.

PROBABLE COST OF IMPROVEMENTS.

Dredging channel across sand bar 200 feet wide and 18 feet deep at low water.....	\$ 57,500
Protection piers at entrance seaward on each side of dredged channel.....	224,600
Present channel to be dammed.....	1,800
	<hr/>
	\$283,900
Dredging channel at head of Young's Island 200 feet wide by 18 feet deep.....	37,000
	<hr/>
	\$320,900

A channel at the head of Young's Island would give access to the main portion of the pond, which is very extensive and deep; its construction might be deferred

until such time when the accommodation for vessels between the Island and the Sand Bar becomes too limited.

INGONISH, SOUTH.

PROBABLE COST OF IMPROVEMENTS.

Dredging channel across sand bar 200 feet wide by 18 feet deep at low water.....	\$31,000
Breakwater on north side of Channel.....	54,000
	<u>\$85,000</u>

I also examined a site proposed for a breakwater at North Ingonish, from Archibald's Point, but took no measurements.

From information obtained on the spot, a breakwater of 1,000 feet in length, terminating into fifteen feet at low water, would give shelter to fifty vessels of from 12 to 15 feet draught, and would cost about \$47,000.

This I consider as a Local work; it would, however, be of great advantage if the projected improvements at Aspee Bay and South Ingonish are not made.

The three preceding harbours were examined between 23rd October and 3rd November, 1871.

See reference, No. 14,911, with application by W. Ross, Esq., M.P., for a sum of \$9,000 for dredging and crib work at Cape North and Ingonish, dated 2nd March, 1871. Also, No. 10,712, of 2nd May, 1870, from same person, respecting Aspee Bay and Ingonish.

CAPE BRETON ISLAND.

NORTH WEST COAST—COUNTY OF INVERNESS.

From Cap St. Laurent, at the north-western extremity of Cape Breton, to Mabou, (a distance of eighty miles) the coast is destitute of harbours with sufficient shelter.

The localities I examined and for which applications have been made are:—

Grande Anse, 15 miles below Cap St. Laurent.

Chéticamp, 35 “ “ “ “

Margarie, 50 “ “ “ “

Chimney Corner 55 “ “ “ “

The most eligible site for improvement with respect to vessels engaged in the Gulf fisheries, between Cape Breton and Prince Edward's Island, is Chéticamp.

Here a very extensive harbour can be formed between the mainland and Chéticamp Island, nearly two and a half miles in length, for the accommodation of vessels drawing fifteen feet of water or more.

At Chimney Corner a harbour of smaller extent might be formed, and would be of great benefit for the important coal mines opened some years ago, but would not be so useful to navigation as at Chéticamp.

Chéticamp should certainly be improved as a Federal harbour.

Any improvements that might be done at Chimney Corner, will depend on the importance the Government may attach to it as a coaling station.

Grande Anse is scarcely susceptible of improvement.

Margarie might be improved as a Local work, but is very much exposed.

PROBABLE COST OF IMPROVEMENTS AT CHÉTICAMP.

Dredging channel 200 feet wide and sixteen feet deep....	\$ 50,000
Protection piers at entrance of dredged channel.....	99,500
Dam from main shore to island	16,700
	<u>\$166,200</u>

PROBABLE COST OF IMPROVEMENTS AT CHIMNEY CORNER.

Breakwater across Bay, in sixteen feet least water at low tide.....	\$145,000
Rock excavation for sixteen feet water seaward, and between breakwater and present pier (\$1 50 per cubic yard)....	123,000
Rock excavation for twelve feet water in remainder of harbour.....	57,000
	<hr/>
	\$325,000

Examination made 27th September to 19th October, 1871.

See reference No. 15,459 of 4th April, 1871, from H. Cameron, Esq., M.P., respecting above harbours; also, reference No. 15,459 from Thos. Evans and others respecting Chimney Corner, asking for a grant of one half of the cost of improvements required; also, reference No. 15,500, of 7th April, 1871, from H. Cameron, Esq., M.P., with memorial from Grande Anse.

SMITH'S ISLAND, COUNTY OF INVERNESS.

(Opposite Port Hood, on North-West Coast of Cape Breton Island.)

This Island, which I examined on 26th September, 1871, forms the western side of Port Hood harbour. The best anchorage and shelter are towards its upper end, opposite the village of Port Hood.

The north-western side of the Island is being washed away from year to year, so that eventually the head will be separated from the main body of the same, and the harbour will then be exposed to filling up from the sea.

I see no immediate necessity for this work, as the distance yet to be cut away by the sea, between the N. W. and N. E. sides of the Island, is about 1,700 feet.

Probable cost of a protection breakwater or breastwork, \$13,600.

This work is of a Federal character.

See reference No. 15,397 of 3rd April, 1871, from H. Cameron, Esq., M. P., forwarding a memorial from inhabitants of Port Hood and Master Mariners.

NORTH COAST OF NOVA SCOTIA, ON NORTHUMBERLAND STRAIT.

WALLACE HARBOUR, COUNTY OF CUMBERLAND.

Forty-five miles above Pictou.

Forty miles below Baie Verte Village.

Thirty-three miles across to Charlottetown, P. E. I.

Examined 14th, 15th November, 1871.

This is a place of sufficient importance to be classified as a Federal Harbour.

The only improvements applied for are the placing of buoys to indicate the entrance into the harbour, and also the widening and deepening of the channel upwards towards the draw-bridge on the Post Road, above the village, for the purpose of enabling vessels to reach the extensive and valuable quarries, from which large quantities of building stone are exported to the United States and elsewhere.

Probable Cost.

ESTIMATE No. 1.—Dredging a channel forty feet wide and fifteen feet deep, at low water.....	\$9,000
Buoys along channel.....	500
	<hr/>
	\$9,500

ESTIMATE No. 2.—Dredging a channel fifty feet wide and sixteen feet deep, at low water.....	\$16,000
Buoys	500
	<u>\$16,500</u>

See reference No. 16,801 of 23rd February, 1871, from Hon. Alex. McFarlane asking for a grant of \$5,000 to be expended in dredging.

NORTH SIDE, BASIN OF MINES, NOVA SCOTIA.

PARRSBOROUGH, COUNTY OF CUMBERLAND.

Twenty-eight miles across Basin of Mines to Windsor; fifty miles by land to Truro.

Present wharf built 1858-59.

Examined 22nd, 23rd November, 1871.

The present wharf is partly undermined towards the shore end, on its upper side; the great quantity of sand accumulated by the sea, against its opposite side has caused it to incline over; the top surface is about three feet lower on one side than the other.

This work being the only point accessible to a steamer on the west side of the Basin of Mines, from Truro eastward, to Cape Chignecto westward, a distance of 85 miles, should be considered as a Federal Work.

The harbour some distance above the wharf is being partly filled with sand and gravel from the sea, the beach between the harbour and the sea being of insufficient height; it should be raised for a distance of about 750 feet and the face of the Light house Pier should be protected against undermining.

PROBABLE COST.

Repairs and protection of landing wharf.....	\$9,400
Raising top surface of beach and protecting light-house pier.	6,000
	<u>\$15,400</u>

SOUTH-WEST SIDE, BASIN OF MINES, NOVA SCOTIA

HANTSPORT—COUNTY OF HANTS.

(Near the Boundary Line between Hants and King Counties.)

On north west side of the River Avon, which empties into the Basin of Mines seven miles below Windsor, at head of the Avon; forty-five miles below Maitland near head of Cobequid Bay; seventy-seven miles above Annapolis, by railway.

Examined 24th to 27th November, 1871.

May be considered as Federal.

This is the only place I have seen on the Basin of Mines, where a pier can be constructed accessible from the Bay of Fundy, at low water, to vessels drawing about 1½ fathoms.

PROBABLE COST.

Breakwater, answering also as a landing pier, if built opposite end of street below wharfs of village.....	\$102,000
Breakwater, answering also as a landing place, if built to foot of bank opposite railway station.....	\$92,000

The latter gives the deepest water. A road to the pier in either case, if required, should be made by local authorities.

See Reference No. 14,983 of 7th March, 1871, inclosing a memorial for a grant of \$20,000 for the construction of a public wharf.

KING'S COUNTY.

King's County is bounded eastward by the Basin of Mines, northward by the Bay of Fundy.

I examined the harbours of this County between the 28th November and the 8th December, 1871.

The following is a list of them, viz:—

1. Oak Point, on the west side of Basin of Mines, 2 miles from Canning, 12 north-east from Kentville railway station, 13 below Hantsport, 20 above Cape Split, and 15 across to Parrsborough.

2. Little Clam Cove and another place near

3. Scott's Bay,

4. Wells' Cove,

5. Ross's Creek,

6. Bennett's Cove,

7. Black Hole,

8. Baxter's Harbour,

9. Hall's Harbour,

10. Chipman's Brook,

11. Canada Creek,

12. Harborville and

13. Morden Cross, on the Bay of Fundy.

Landing piers accessible at high water have already been constructed by the Local Government or otherwise at Oak Point, Baxter's Harbour, Hall's Harbour, Chipman's Brook, Canada Creek, Harborville and Morden Cross.

The best site for a Federal Harbour, accessible at all stages of the tide on the Bay of Fundy coast, is, in my opinion, at Hall's Harbour or at Harborville; the latter would make the best harbour and could be easily reached from the Annapolis and Windsor Railway, but it is scarcely more than 12 miles above Margaretville, whereas Hall's Harbour is nearly 27 miles above the same place. Both are places of importance.

At Oak Point, which should also be considered as a Federal work, the present pier requires to be strengthened and extended. This place is the outlet of a large agricultural district.

PROBABLE COST OF PROJECTED WORKS.

Extension and protection of present pier at Oak Point, \$19,000.

HALL'S HARBOUR.

Breakwater required on east side, ending in 16 feet water at low water; estimate based on soundings sent me by L. D. V. Chipman, Esq., M.P.....	\$120,000
Raising and extension of present pier to the same depth of water at low water	117,000
Dredging channel 100 feet wide on the east side of present pier to admit vessels into upper part of harbour at high water.....	5,000
	<u>\$242,000</u>

HARBORVILLE.

Breakwater required on east side, ending in 16 feet to 17 feet at low water.....	\$135,000
Extension of present pier on west side of harbour.....	128,000
	<u>\$263,000</u>

See reference No. 14877, of 27th February, 1871, from L. D. V. Chipman, Esq., M.P., with memorial from inhabitants of Scott's Bay, for a grant of \$4,000.

Also see reference No. 14,883 of 1st March, 1871, from L. D. V. Chipman, including a memorial for a grant of \$6,000 for the construction of a pier or steamboat landing this year.

Also No. 14,874, of 27th February, 1871, from E. Biglow and others, for a grant of \$2,500, for a breakwater at Ross's Creek.

COUNTY OF ANNAPOLIS, ON SOUTH-WEST COAST, BAY OF FUNDY.

Port Williams (Port Lorne) about fourteen miles below Margaretville.

Examined 9th December, 1871.

It is doubtful whether this harbour should be considered as one of a Federal character or not, on account of its proximity to Margaretville, unless the Government should find it proper to do so, as there is but one harbour in a distance of forty miles to Digby Gut.

The improvement required at this port, is the extension of the present pier down to the low water line, or for a distance of about 300 feet.

Probable cost projected extension, \$18,000.

See reference No. 15,258, of 24th March, 1871, enclosing memorial from the Port Williams Pier Company and others, applying for a grant of \$2,000 towards the construction of the extension of the present pier.

DIGBY COUNTY, ON WESTERN COAST, NOVA SCOTIA.

Sissiboo River.

Outlet at village of Weymouth, about nineteen miles below Digby, on St. Mary's Bay.

Reference No. 15,005 of 8th March, 1871, contains a memorial from the inhabitants of Weymouth, praying for a grant of \$800 or \$1,000, during two years, towards cleaning out the north-east branch of the river.

I called at Weymouth, on the 13th December, 1871, with the intention of examining this portion of the river, but could not, as it is situated in the midst of the forest, without any road along the same.

According to information furnished me in the locality by Colin Campbell, Esq. the first twelve miles of the river, from its outlet upward, are unobstructed; the next eighteen miles are obstructed by granite blocks of from seven to fifty tons. The rocks are in the rapids, viz:—

1st. At the junction of the north-east branch and the Main River.

2nd. At two miles above this junction.

3rd. At one mile further.

4th. At one and a-half miles above the latter point.

5th. From the main stream to second Wallace Lake, one mile obstructed. This is the principal part to be cleared.

6th. From first to second lake, three-quarters of a mile obstructed.

The largest quantity of timber is to be found around Tom Wallace and Little Wallace Lakes, at about thirty miles from the outlet of the river.

The timber consists chiefly of pine and spruce.

What is wanted is an unobstructed passage for single logs for a distance of eighteen miles.

Last year the quantity of lumber made on the Sissiboo amounted to about three millions of feet, board measure. This quantity might be doubled or trebled if the stream was improved.

Whether the work should be considered a Federal one or not, I am not prepared to say. The revenue derived from the lumber trade in the locality will probably enable the Government to decide this question.

METEGHAN HARBOUR.

ALSO ON ST. MARY'S BAY.

About 38 miles below Digby.

The memorial from the inhabitants of this portion of Digby County, dated 6th February, 1871, in reference No. 14,918 of 3rd March, 1871, prays for a grant to aid them to repair the public wharf at Meteghan.

My examination of the harbour was made in company with the local member, H. Doucet, Esq., M.P.P.

I was informed that the river is about eighteen miles in length, that there are twenty mills upon it, ten of which send lumber to Meteghan. Each mill is said to furnish 100,000 feet of lumber; one of the mills furnishes nearly 500,000 feet.

Lumber is shipped in large quantities from the harbour to the West India Islands and the United States, and regular packets run during the summer season to Boston and St. John.

The present wharf requires to be extended and repaired.

This, in my opinion, should be classified as a Federal work.

Probable cost of improvements required :

Repairing and raising present pier, which was constructed more than 17 years ago.....	\$3,700
Extension of 200 feet, so as to render present pier accessible at half tide.....	9,400
Dredging inside of harbour.....	800
	<u>\$13,900</u>

COUNTY OF YARMOUTH, ON WESTERN COAST, NOVA SCOTIA.

GREEN COVE OR MAITLAND.

Eleven miles above Yarmouth.

I examined the public wharf and harbour of this locality, on 12th December, 1871.

It is about midway between Meteghan and Yarmouth.

Any improvements that might be done here, should in my opinion, be executed by the Local Government.

No estimate therefore is furnished.

YARMOUTH HARBOUR.

Eleven miles below Green Cove.

Reference No. 15,487, of 5th April, 1871, encloses a memorial from the inhabitants of Yarmouth, praying that the bar or beach extending from Stanwood's Point to the West Cape, and separating the Harbour from the Bay of Fundy, and in which reaches have been made by the sea, may be repaired and protected.

I examined this beach on the 11th December, 1871, in company with F. Killam, Esq., M.P., and other gentlemen.

PROBABLE COST OF WORK REQUIRED.

Protecting beach at top surface, and filling breaches by means of crib-work, from the present crib work downwards, for a distance of 2,300 feet.....	\$9,000
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It was suggested, in lieu of the above proposed protection crib work, to construct a breakwater between the harbour and the beach, in order not only to prevent the sea from washing the beach into the harbour, but also for the purpose of improving the direction of the current in the same. Such a work would cost, if substantially executed, nearly..... \$54,00

The immediate protection of the beach for the smaller sum, appears to be preferable.

Any improvements that may hereafter be required in the harbour, are subject for future consideration.

The season was too far advanced, and my time was too limited to allow me to proceed to Larry's Harbour and Ragged Head, in Chedabucto Bay, Guysborough County, Nova Scotia, and to Grand River and the St. Peter's Canal, in Richmond County, Cape Breton Island, Alexander McNab, Esq., civil engineer, was instructed at my request, to examine these harbours and report thereon to the Department. See references Nos. 10,970, 14,970, 14,973, 15,639 of 16th May, 1870, 7th March 25th March, 1871.

My examination of Little Hope Island and of the harbours at Liverpool, Digby, Margareville, Maitland, Arisaig, McNair's Cove, Port Hood, Mabou, Nova Scotia and at Quaco, New Brunswick, for which grants were made during the last Session of Parliament, will form the subject of a separate report, if required, in addition to my previous communications concerning the same.

I have appended to this report a brief description of most of the localities examined, according to the best authorities, up to the present time, also a series of questions I addressed in each of the localities, to the most prominent parties, respecting each of the harbours and the prices of materials for the projected works at each place, and also the answers given to the questions in each case,—the whole instructed by your two letters, Nos. 11,054, 11,055 of the 4th July, 1871—enumerating the harbours where works were to be constructed or examinations to be made.

I have the honour to be, Sir,
Your obedient servant,

G. F. BAILLAIRGÉ,

*Assistant Chief Engineer Public Works
Canada.*

F. Brown, Esq.,
Secretary Public Works,
Ottawa.

N.B.—A further sum of ten per cent. must be added to each of the foregoing estimates for superintendence and contingencies.

G. F. B.

APPENDIX TO G. F. BAILLAIRGÉ'S REPORT ON HARBOURS, MARITIME PROVINCES.

WESTMORLAND POINT, N.B., 20th November, 1871.

SIR,—I beg to request you will proceed to Beaver Harbour, in the County of Charlotte, New Brunswick, and take such measurements, levels and soundings as are requisite to determine the best site for the construction of a breakwater.

When your survey is completed, you will please submit a plan of the same, together with a report, respecting the usefulness of the projected work to the general interest of navigation.

Amongst the various papers enclosed herewith, in reference to the work, you will find a petition, No. 6,718, dated 14th May, 1869, from the inhabitants of the parishes of Pennfield and St. George in the above named County.

Your professional services will be paid for at the rate of \$4 per diem, with an extra allowance of \$1.50 for hotel expenses, exclusive of travelling fare.

You are authorized, in case of acceptance, to employ an assistant at the rate of \$1.20, exclusive of his disbursements for board and travelling expenses.

I have the honour to be, Sir,
Your obedient servant,

G. F. BAILLAIRGÉ,
Assistant Chief Engineer, Dominion of Canada.

ALEXANDER MUNRO, Esq.,
Port Elgin, Westmorland County,
New Brunswick.

PORT ELGIN, WESTMORLAND, April 15th, 1872.

SIR.—In compliance with instructions from G. F. Baillairgé, Esq., C. E., dated 10th November, 1871, requesting me to proceed to Beaver Harbour, in the County of Charlotte, New Brunswick, and take such measurements, levels and soundings as are requisite to determine the best site for the construction of a breakwater; and submit a plan for the same, together with a report respecting the usefulness of the projected work to the general interests of navigation.

I beg leave to submit the following report and accompanying plan:

The greater part of the shore line of Beaver Harbour is high and rocky and the country sterile and sparsely populated. The rocks contain several veins of sulphate of copper, which have been mined to a limited extent.

The harbour teems with herring, cod, shad, mackerel and other useful fish.

The industry of the place is chiefly confined to fishing, employing ten schooners of an aggregate of 241 tons and 21 boats.

This harbour is well protected by high lands, except on the south side. The only sheltered part from prevailing southerly winds, is on the west side opposite the village.

This part of the harbour is sufficiently capacious and safe to accommodate the shipping owned in the place, but insufficient to accommodate the fleet of fishing and other vessels which are compelled to take refuge there, in the event of southerly storms,

The number of vessels that annually enter is variously estimated at from three hundred to five hundred. Three hundred and fifty, however, exclusive of local vessels, may be set down as the number that enter for shelter during the year. A large part of these is from Nova Scotia. From five to fifteen square rigged vessels and upwards of sixty schooners have been frequently seen in this harbour at a time.

The westerly passage is excellent for large class vessels, and the anchorage is generally good. Easterly of this passage are three rocky shoals, marked on the plan, which render navigation, on the east side, dangerous during storms. The harbour opposite the village is protected from southerly winds by a hill which is 80 feet in height; but the water near the shore is so shallow, that not more than half the vessels, which enter the harbour at a time, can be protected from southerly storms.

Consequently, a breakwater erected southerly of the village, extending from the base of the hill, as shown on the plan, would be of great benefit to the general interests of navigation.

The cost of such a work would largely depend on the extent to which it may be intended to afford shelter to shipping. A breakwater 350 feet in length might be

erected, extending from the point named in the direction of Goal Rock, for about four thousand dollars, the sum asked by the petitioners, and be of considerable service to the general interests of navigation. But what is really required is a breakwater 550 feet long, so as to afford shelter for one hundred vessels at least, which would cost more than double that amount.

A profile view of the proposed breakwater is shown on the plan.

I have the honour to be, Sir,

Your most obedient servant,

ALEXANDER MUNRO,
Provincial Land Surveyor.

The Honourable

The Minister of Public Works,
Ottawa.

No. 22,354.

OTTAWA, 22nd April, 1872.

SIR,—I have the honour to transmit you, herewith the plan and estimates of the proposed improvements at Shippagan Gully, according to the survey made under my instructions, by Mr. Joseph Rosa, in November and December, 1871, together with his report thereon, on the 2nd instant.

Fortunately, the ice formed across the Gully, shortly after his arrival at Shippagan; this enabled him to sound the channel from Shippagan Harbour downward to the southern end of the Gully, on the Gulf of St. Lawrence, more expeditiously, and with greater exactness than if the operation had been done in open water, on account of the rapid current passing through.

The main obstacle to the passage of boats and vessels through the Gully, between the Gulf and the Baie des Chaleurs, is the shallowness of the water across the bar at the southern entrance or outlet of the Gully, and of the channel leading therefrom north-westward to Shippagan Harbour.

DESCRIPTION OF PRESENT CHANNEL.

According to the plan now furnished, the upper portion of the channel, from opposite the English Church of Shippagan, thence downward for 3,000 feet, obstructed by a shoal of sand and gravel, about 300 feet in width and 1,500 feet in length; the depth of water on this shoal varies from $3\frac{1}{2}$ to 7 feet, at extreme low water: above this shoal the channel is from 600 feet to 800 feet in width; on the western side of the shoal, its width varies from 400 feet at the upper end, to 100 feet at the lower end; on the eastern side of the shoal, it varies from 200 feet near the upper end, to 500 feet at the lower end; the navigable depth of water in this portion of the channel, passing to the eastward of the shoal, is from fifteen to 18 feet.

The continuation of the channel for a further distance of 5,500 feet, varies from 500 to 600 feet in width, and from $16\frac{1}{2}$ to 20 feet in depth, towards Indian Point.

Thence the channel is circuitous, and very irregular in width, until it reaches the bar at the southern outlet, 6,200 feet further; this portion of the channel is from 500 to 150 feet wide, and from 10 to 18 feet deep.

Over the bar the channel is about 200 feet in width, and from $6\frac{1}{2}$ to 11 feet in depth.

At 800 feet seaward it increases to a width of 600 feet, and diminishes to depth of $1\frac{3}{4}$ feet; thence, at 700 feet further, it decreases to a width of 300 feet, and increases in depth to $3\frac{3}{4}$ feet; thence, it widens out to 600 feet, the depth varying from $2\frac{1}{2}$ to 10 feet at a distance of 700 feet more; thence, for a 1,000 feet further, expands into the Gulf, where a depth of $15\frac{3}{4}$ feet is reached at a total distance 3,200 feet in a south-westerly direction from the middle of the bar.

The soundings shown on the plan, and those stated in this Report, are referred to extreme low water spring tides.

Bayfield, in describing the gully, states that the tide is generally extremely rapid in it, that the bar of sand at its southern outlet on the gulf dries in part at low water and shifts in heavy gales, but that there is generally a channel with 4 or 5 feet at low water across the bar, and that the tide rises from 3 to 5 feet, according as it may be neap or spring tides. The passage over the bar and into the gully is difficult and dangerous to strangers, but is continually used by the native fishermen with their small schooner-rigged shallops. On his map, No. 2,686, published in 1887, he shows the channel of the gully passing between shoals of sand and mud, partly covered with weeds.

According to observations made by Mr. Rosa, during his survey, the current runs from the gulf into the gully at $\frac{1}{2}$ ebb tide and out of it from the Baie des Chaleurs at $\frac{1}{2}$ flood tide.

PROPOSED IMPROVEMENTS.

As the class of vessels navigating the Baie des Chaleurs and the Gulf from Campbellton to Pictou requires a draught of from 12 to 15 feet, the latter has been taken as the basis of the improvements proposed. These consist in dredging a new channel on a straighter course than the present one, from opposite Indian Point downward to the present channel across the sand bar, and thence through the old channel into the Gulf to a depth of 15 feet at extreme low water spring tides, in the direction shown by the red dotted lines, or in dredging the old channel throughout to the same depth; the outlet into the Gulf in both cases, being protected by a breakwater upon its eastern side.

The breadth of channel to be dredged should be 300 feet; it might, however, suffice for the present to reduce it to 150 feet, and to increase it hereafter to that first stated.

The construction of a breakwater at the Gulf outlet of the Gully is necessary in order to prevent the filling up of the dredged channel by sand during easterly or south-easterly winds.

The total length of the new channel, which it is proposed to dredge, is 7,750 feet.

The total length of the breakwater required is 2,600 feet.

In addition to the above works, it will be necessary to protect the eastern end of the bar for 1,100 feet or more, against the action of the sea, by means of stakes and brush, across what is known as the East Gully, wherein the depth of water at low tide is from 1 to 3 feet; this mode of protection which it appears has been adopted on other parts of the bar will cause the sea-sand to accumulate in the breach, and prevent the water of the Gully from washing it out.

ESTIMATES.

The probable cost of the projected works is shown by the various estimates appended to Mr. Rosa's Report. It varies from \$310,718 to \$103,550, according to the location and dimensions of the channel to be dredged, and the mode of constructing the breakwater.

The latter may be constructed on the present bed of the Gulf shore, at 50 feet from the side of the dredged channel, or it may be sunk to the same depth as the bed of the new channel. The former mode has been tried with success, I am told, at three harbours in Newfoundland, in localities similar to the outlet of Shippagan Gully. The latter mode, which is certainly the safest, will, in the present instance, add \$68,000 to the cost of the work.

OBJECT OF PROPOSED IMPROVEMENTS.

The main advantages to be gained by the projected improvements of Shippagan Gully, are as follows, viz. :—

1st. The dangerous route around Miscou Island, at the south-eastern extremity of the Baie des Chaleurs would be avoided.

2nd. The distance from the Gulf ports along the shore, extending from Pictou to Miramichi, and from those of Prince Edward Island to those on the Baie des Chaleurs, from Shippagan on the south shore and Port Daniel on the north shore, to Campbellton at the head of the Bay, will be shortened about 50 miles.

3rd. The Gully, as stated by Capt. Leach, of the "Rothesay Castle" steamer (No. 14,724), would serve as a harbour of refuge for the storm-tossed fishermen who should happen to be caught out near Point Miscou by a north-east gale, as there is no harbour that a vessel can make in a north-east gale south of Point Miscou, nearer than Shediac, distant 150 miles.

4th. The recurrence of such a serious loss of life as that which occurred in 1857, when seventy lives were lost, because the fishing shallops and vessels could not enter the Gully owing to the shallowness of the water and the want of a breakwater at the entrance, would be avoided.

Attached to Mr. Rosa's report you will find the answers to a series of questions which I thought it useful to prepare, respecting the population, trade, resources, prices of lumber, stone, &c., number of fishing vessels, prevailing winds, and the closing and opening of navigation at each of the harbours, I was instructed to examine in the Maritime Provinces, last year, as per No. 11,055, Sub. 991, dated 4th July, 1871.

Returned herewith are references Nos. 10,304, 14,724, of 5th April, 1870, and 21st February, 1871, from Hon. T. W. Anglin and J. Ferguson, enclosing a petition from merchants and ship-owners; also, No. 14,795, of 24th April, 1871, containing J. E. Boyd's report, with one of Bayfield's charts of the locality to be improved.

I have the honour to be, Sir,

Your most obedient servant,

G. H. BAILLAIRGÉ,

Assistant Chief Engineer.

F. BRAUN, Esq.,
Secretary of Public Works,
Ottawa.

OTTAWA, 2nd April, 1872.

SIR,—In compliance with your instructions of November, 1871, I have the honor to report that I proceeded to Shippagan, in New Brunswick, to take soundings in the Gully, and to estimate the cost of dredging a channel 15 feet deep at low water, in order to give a shorter route to the steamers plying between Campbellton and Pictou, and to permit the schooners and other fishing crafts to seek for shelter during a gale in Shippagan harbour, by passing through the Gully.

The entrance to Shippagan harbour, at its mouth on the Gulf of St. Lawrence, is obstructed by a sand bar, or dune ("dune") formed by east and south-east winds. The currents have increased the dune at the interior of the Gully.

As there are only 2 to 5 feet of water on this sand bar at low water, and as the slightest wind causes the sea to break thereon, it is impossible even for fishing crafts to cross it.

Between Miscou and Miramichi, a distance of about eighty-five miles, there is no harbor where steamers, schooners, or smaller boats caught by a storm, can seek shelter. As Shippagan harbour is about mid-way between these two places, it would be advantageous to the interests of the coasting trade and navigation, if the channel of the Gully is deepened, widened and straightened, so as to give access to the har-

bour ; it would also be necessary to dredge a channel through the sand bar or down, at the southern extremity of the gully, and to build a breakwater on the east side of the dredged channel in order to prevent the sea, when the wind blows from the east or south-east, from filling it up with sand.

If these improvements were made, the Gulf steamers and the schooners leaving Campbellton and other ports along the Baie des Chaleurs, for Miramachi, Shediac, Baie Verte, Pictou, and other ports of New Brunswick, would pass inside Miscou Island, through Shippagan harbour and out by the Gully ; thus the dangers of Miscou Island Point would be avoided, and the distance shortened forty-five to fifty miles.

So as to give you an approximate estimate of the cost of deepening the channel to fifteen feet at low water, I sounded three lines nearly parallel to each other, two and a-half miles long, starting opposite Shippagan Church and running as far as the outlet of the Gully, and then sounded along that same distance, and across the Gully, seven lines measuring 2,000 to 2,500 feet long. I also sounded five other lines outside the Gully to a depth of twenty feet of water. The length of these lines varied from 3,500 to 3,900 feet. All those soundings, from Shippagan Church to the outlet of the gully, were taken through the ice.

I also made a survey on the east side of the Gully, so as to show the position of the channel and the sounding lines.

With the present Report I transmit you a plan of the Gully, so as to show the soundings, the proposed breakwater, etc. On the plan, the present channel is indicated by two red dotted lines.

Herewith you will find—

1st. An estimate of the cost of dredging a channel 300 feet at the bottom and fifteen feet deep at low water ; another estimate for a channel 150 feet wide.

2nd. An estimate of the cost of dredging the present channel 300 feet wide at the bottom, and 15 feet deep at low water ; and another estimate for the widening of the present channel to 150 feet.

3rd. Two estimates of the cost of the breakwater : the first for a breakwater to be constructed on the dredged bottom, and the second for one to be constructed on the present bottom at about fifty feet to the east of the proposed channel.

4th. A summary of the preceding estimates.

5th. Questions respecting Shippagan Harbour, and answers to the same by the principal inhabitants of the place.

6th. Questions and answers respecting the cost of materials for the construction of the breakwater.

The whole humbly submitted.

I have the honour to be, Sir,

Your humble and obedient servant,

JOSEPH ROSA.

A. F. BAILLAIRGÉ, Esq.,

Assistant Chief Engineer,

Department of Public Works.

APPROXIMATE Estimate of the cost of dredging a channel 15 feet deep at low water in Shippagan Gully and through the sand-bar or "dune" at the southern extremity of the Gully.

Dredging a channel 300 feet wide at the bottom and 15 feet deep at low water=747,300 cubic yards at 25c. per yard.....	\$186,825 00
Dredging for a channel 150 feet wide at the bottom= 363,419 cubic yards at 25c. per yard.....	90,854 75
305	

APPROXIMATE Estimate of the cost of dredging the present channel of Shippagan Gully and the sand-bar or "dune" at the southern extremity of the Gully to 15 feet at low water.

Dredging the present channel to a depth of 15 feet at low water and to a width of 300 feet at the bottom=420,608 cubic yards at 25c. per yard....	\$105,152 00
Dredging the present channel to a width of 150 feet at the bottom=214,482 cubic yards at 25c. per yard.....	53,620 50

APPROXIMATE Estimate of the construction of a breakwater, at the southern extremity of Shippagan Gully, 2,600 feet long, 20 feet wide at the top, with a slope of 1 in 12 feet on the western side, and $\frac{1}{2}$ in 1 foot on the eastern side.

For a breakwater constructed on the dredged bottom=65,000 cubic yards at \$1.50 per yard.....	\$117,000 00
Add the dredging at the site of the breakwater=27,572 cubic yards at 25c. per yard.....	6,893 00
	<hr/> \$123,893.00

For a breakwater built on the present bottom in 12 feet of water at low water=30,516 cubic yards at \$1.80 per yard.....	54,928 80
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SUMMARY of the three preceding estimates:—

For a channel 300 feet wide at the bottom, and a breakwater built on the dredged bottom.....	\$310,718 00
For a channel 300 feet wide at the bottom, and a breakwater built on the present bottom.....	241,753 80
For a channel 150 feet wide at the bottom, and a breakwater built on the dredged bottom.....	214,747 75
For a channel 150 feet wide at the bottom, and a breakwater built on the present bottom.....	145,783 55
To dredge the present channel 300 feet wide at the bottom, and 15 feet deep, and build a breakwater on the dredged bottom.....	229,045 00
To dredge the present channel 300 feet wide at the bottom, and 15 feet deep, and build a breakwater on the present bottom.....	160,080 80
To dredge the present channel 150 feet wide and 15 feet deep, and build a breakwater on the dredged bottom.....	177,513 50
To dredge the present channel 150 feet wide and 15 feet deep, and build a breakwater on the present bottom	108,549 30

SHIPPAGAN.

QUESTIONS RESPECTING HARBOUR.

1. Population ?
2. Exports consist of ? Tons of ?
3. Imports consist of ? Tons of ?
4. Exports generally sent to ?
5. Imports generally sent from ?
6. Salmon taken in river ? Quantity ?
7. Number of vessels frequenting harbour ?

8. Tonnage of vessels frequenting harbour ?
9. Number of vessels loading in harbour ?
10. Greatest draught of water of largest vessels loaded ?
11. Fish ? Quantity of each taken and exported ?
12. Minerals consist of ?
13. Agricultural products consist of ?
14. Prevailing winds, Spring ? Summer ? Autumn ?
15. Winds causing heaviest sea at entrance of harbour ?
16. Ice takes in inside of harbour ?
17. Ice takes in outside of harbour ?
18. Harbour clear of ice inside ?
19. Harbour clear of ice outside ?
20. Bottom of harbour, inside, clay, sand, gravel, or rock ?
21. Bottom of harbour, outside, clay, sand, gravel, or rock ?
22. Number of vessels, size, etc., owned in harbour ?
23. Number of fishing boats owned in harbour ?
24. Inner harbour capable of sheltering how many vessels of heaviest draught ?
25. Length, width, depth, name of river emptying into harbour ?
26. Fog ?
27. Seaworms ?
28. Number of American vessels fishing off the coast ?
29. Where do they go for shelter in north-east gales ?
30. Where do they go for shelter in south-west gales ?
31. Which wind causes mouth of river or gully to fill with sand the quickest generally ?
32. Which wind will clear mouth of river the soonest, generally ?
33. What wind clears out the entrance most ?
34. What is the best shelter the harbour affords as it is ?
35. What class of steamer would be placed on the route through Shippagan gully if it is deepened to a depth of 18 feet ?
36. What is the greatest width of channel that is required for steamboats and vessels navigating the Baie des Chaleurs ?

ANSWERS TO GENERAL QUESTIONS, RESPECTING SHIPPAGAN HARBOUR, GLOUCESTER COUNTY, GULF OF ST. LAWRENCE, NEW BRUNSWICK.

1. Population, about 2,000.
2. Exports consists principally of dry codfish.
3. Imports consist of British merchandise and fishery outfits, including British salt, also foreign salt.
4. Exports are generally sent to the United Kingdom and Europe.
5. Imports are generally from Great Britain and Jersey, with salt from Naples and Cadiz.
6. No salmon taken.
7. About twenty vessels frequent harbour, including those employed only within the Dominion.
8. The tonnage cannot be given precisely, as many of the class of vessels, alluded to above, are not noticed officially; but the total tonnage of vessels, visiting the harbour, would probably be 1,300. Vessels employed in the fish trade here are not of a large size.
9. Six vessels of 754 tonnage are loaded in the harbour with exports beyond the Dominion.
10. The greatest draught of water of vessels in the harbour is 18 feet, but ships drawing 20 feet have loaded here with lumber some years since.
11. The quantity of fish taken is about 16,680 quintals or cwt., besides several thousand barrels of pickled herrings and alewives, which being generally shipped to Halifax or other ports within the Dominion, cannot be called exported.

12. No minerals.
13. Agricultural products consist of potatoes and other vegetables. Hay, wheat barley, pease, buck wheat and oats.
14. Winds in spring are various: in summer, southerly; in autumn, west south-west and north-west.
15. Winds causing the heaviest sea, east-south-east and south.
16. Ice takes permanently inside of harbour about 1st December.
17. Ice outside of harbour about 1st January, but not stationary, and some winters the ice moves off and toward the land all winter, according to the wind.
18. Harbour gets clear of ice inside generally between the 28th April and 6th May; but at the south entrance about ten days earlier.
19. When westerly and northerly winds prevail the ice frequently clears off the coast about the middle of March, and may return with a contrary wind; but unless there is an extraordinary prevalence of easterly winds, the ice is generally quite cleared away on the Gulf side by the 15th April.
20. (Sand).
21. (Sand).
22. There are three schooners owned in harbour, of 120 tons. There are, however, large shares held in ships belonging to the Island of Jersey.
23. There are about 150 large fishing boats not decked, and ten small decked schooners, comprising about 240 tons.
24. The inner harbour is capable of sheltering about 500 vessels.
25. There is no river, excepting a small stream at the head of St. Simon's.
26. Fog is of very rare occurrence indeed.
27. Sea-worms, if there are any here, are not known to do any damages here.
28. American vessels fishing off the coast average 300 sails.
29. Where vessels go for shelter in north-east gales depends much on their position at the time; generally to Prince Edward Island, the mouth of Miramichi, Little Shippagan, or the shelter of the Island of Miscou.
30. Where vessels go for shelter in south-west gales depends much on their position at the time; generally to Prince Edward Island, the mouth of Miramichi, Little Shippagan, or the shelter of the Island of Miscou.
31. Winds causing gully to fill with sand are north-east by east, and south-east.
32. The wind which clears sand from mouth of the river or gully the quickest is north-west.
33. The wind which clears sand from entrance is north-west.
34. The shelter afforded by the harbour is nearly complete with any wind; may not be quite so good with north wind, but even then there is a spacious and excellent shelter in the St. Simon's Inlet, with 18 or 20 feet of water.
35. Cannot say what class of steamers would be put on the route if Shippagan Gully was deepened to 18 feet depth.
36. Do not know the greatest width of channel required for vessels navigating the Baie des Chaleurs.

N.B.—Having examined the within answers, we approve of them.

WILLIAM TAYLOR,
Merchant.

P. J. N. DUMARESQ,
Collector of Customs.

WILLIAM IRVING & Co.,
Merchants.

GENERAL Questions respecting Prices of Lumber at Shippagan Harbour.

	Name of Wood.	Size.	Length.	
		Inches.		
Price of square timber...	Pine.....	12 × 12	30 feet long....	Per ton.
do do	do	12 × 12	25 do ...	do
do do	do	12 × 12	20 do ...	do
do do	Spruce.....	12 × 12	30 do ...	do
do do	do	12 × 12	25 do ...	do
do do	do	12 × 12	20 do ...	do
do do	Hemlock.....	12 × 12	30 do ...	do
do do	do	12 × 12	25 do ...	do
do do	do	12 × 12	20 do ...	do
do do	Yellow Birch.....	12 × 12	30 do ...	do
do do	do	12 × 12	25 do ...	do
do do	do	12 × 12	20 do ...	do
do do	Maple.....	12 × 12	30 do ...	do
do do	do	12 × 12	25 do ...	do
do do	do	12 × 12	20 do ...	do
do do	round timber... Pine.....	14 inches at small end...	30 do ...	Per stick.
do do	do	14 do	25 do ...	do
do do	do	14 do	20 do ...	do
do do	Spruce.....	14 do	30 do ...	do
do do	do	14 do	25 do ...	do
do do	do	14 do	20 do ...	do
do do	Hemlock.....	14 do	30 do ...	do
do do	do	14 do	25 do ...	do
do do	do	14 do	20 do ...	do
do do	Yellow Birch.....	14 do	30 do ...	do
do do	do	14 do	25 do ...	do
do do	do	14 do	20 do ...	do
do do	Maple.....	14 do	30 do ...	do
do do	do	14 do	25 do ...	do
do do	do	14 do	20 do ...	do
do do	Batted timber... Fir.....	6 inches thick	30 do ...	do
do do	do	6 do	25 do ...	do
do do	do	6 do	20 do ...	do
do do	do	6 do	15 do ...	do
do do	Spruce.....	6 do	30 do ...	do
do do	do	6 do	25 do ...	do
do do	do	6 do	20 do ...	do
do do	do	6 do	15 do ...	do
do do	Hemlock.....	6 do	30 do ...	do
do do	do	6 do	25 do ...	do
do do	do	6 do	20 do ...	do
do do	do	6 do	15 do ...	do
do do	snubbing posts. Yellow Birch.....	16 inches diameter.....	10 do ...	do
do do	Oak.....	16 do	10 do ...	do
do do	Tamarack.....	16 do	10 do ...	do
do do	3-inch plank... Pine.....	.....	.....	Per M.F.B.M.
do do	Spruce.....	.....	.....	do
do do	Hemlock.....	.....	.....	do
do do	stone delivered	.....	.....	Per ton.
do do	iron do	.....	.....	do

N.B.—If any of the above materials cannot be procured in the locality, state where they can be purchased, and at what price.

G. F. BAILLAIRGÉ.
Assistant Chief Engineer Public Works.

ANSWERS to General Questions respecting Prices of Lumber, Shippagan Harbour
Gloucester County, Gulf of St. Lawrence, New Brunswick.

	Name of Wood.	Size.	Length.	Price.
		Inches.		\$ ct
Square timber.	Pine.....	12 × 12	30 feet long, per ton.....	4 00
do	do	12 × 12	25 do	to
do	do	12 × 12	20 do	3 00
do	Spruce.....	12 × 12	30 do	3 00
do	do	12 × 12	25 do	to
do	do	12 × 12	20 do	2 00
do	Hemlock.....	12 × 12	30 do	3 00
do	do	12 × 12	25 do	to
do	do	12 × 12	20 do	2 00
do	Yellow birch.....	12 × 12	30 do	5 00
do	do	12 × 12	25 do	5 00
do	do	12 × 12	20 do	5 00
do	Maple.....	12 × 12	30 do	6 00
do	do	12 × 12	25 do	to
do	do	12 × 12	20 do	5 00
Round timber.	Pine.....	14 inches at small end...	30 feet long, per stick.....	2 00
do	do	14 do do	25 do	2 00
do	do	14 do do	20 do	2 00
do	Spruce.....	14 do do	30 do	1 00
do	do	14 do do	25 do	to
do	do	14 do do	20 do	0 00
do	Hemlock.....	14 do do	30 do	1 00
do	do	14 do do	25 do	to
do	do	14 do do	20 do	0 00
do	Yellow birch.....	14 do do	30 do	3 00
do	do	14 do do	25 do	to
do	do	14 do do	20 do	1 00
do	Maple.....	14 do do	30 do	4 00
do	do	14 do do	25 do	to
do	do	14 do do	20 do	2 00
Flatted timber.	Fir.....	6 inches thick.....	30 do	1 00
do	do	6 do	25 do	0 00
do	do	6 do	20 do	0 00
do	do	6 do	15 do	0 00
do	Spruce.....	6 do	30 do	0 00
do	do	6 do	25 do	0 00
do	do	6 do	20 do	0 00
do	do	6 do	15 do	0 00
do	Hemlock.....	6 do	30 do	0 00
do	do	6 do	25 do	0 00
do	do	6 do	20 do	0 00
do	do	6 do	15 do	0 00
Snubbing posts.	Yellow birch.....	16 inches, diameter.....	10 do	1 00
do	Oak (none).....	16 do	10 do	0 00
do	Tamarac (none).	16 do	10 do	0 00
Three inch.	Pine plank.....		Per M.F.B.M.....	12 00
do	Spruce.....		do	8 00
do	Hemlock.....		do	8 00

Stone: Not known exactly, but would be cheap.

Iron: Cannot say.

(Signed) WM. TAYLOR,
Merchant,

" WM. FRUING & Co.,

" P. I. N. DUMARESG,
Collector of Customs.

To JOSEPH ROSA, C.E.,
No. 6, Queen St., Quebec.

Port Williams.

Spruce timber is the most abundant; other timbers are scarce.

		\$	cts.
Square timber, Spruce, 12" x 12", 30 ft. long....	per stick	3	00
" " " 12" x 12", 25 " "	"	2	50
Round " " 14" smallest diameter, 25 to 30 ft. long.....	per stick	2	00
" " " 20 " " " " " "	"	1	50
Flatted " " 6" thick, 25 to 30 ft. long " "	"	0	40
" Fir, " " 6" " 20 " " "	"	0	30
" " " 6" " 15 " " "	"	0	25
Spruce or Yellow Birch for snubbing posts, 16" diameter, 10 ft. long.....	per stick	1	50
Three-inch Spruce Plank.....	M.F.B.M.	9	00
" " Yellow Birch Plank.....	"	16	00
Stone, delivered (Boulders).....	per ton	0	25
Iron for bolts.....	"	48	00

Meteghan.

Pine timber is scarce.

Square timber, Spruce, 12" x 12", 20 to 30 ft. long, per ton	4 to 5	00
" " Hemlock, 12" x 12", 20 to 30 ft. long "	3 to 4	00
Round " Spruce and Hemlock, 10" diameter at small end, 20 to 30 ft. long.....per ton		3 00
Flatted Spruce, 6" thick.....	M.F.B.M.	10 00
Stone from beach.....per ton		0 25
Wrought Iron from St. John.....	"	45 00
" double refined.....	100 lbs.	2 50
Three-inch Spruce Plank.....	M.F.B.M.	8 00
Spruce logs, 16" diameter, 10 ft. long.....each		1 00
" 10" " 25 " for outside protection of wharf.....each		1 00
Top covering, Spruce 6" thick.....sup. ft.		0 06

As square timber 12 x 12 of any description is generally scarce, it would be advisable to allow timber of smaller dimensions in the works to be constructed. The timber most generally used in the works, I examined last year, may be averaged at 10 inches.

Plans of the other harbours will be forwarded as soon as completed.

I have the honour to be, Sir,

Your obedient servant,

G. F. BAILLAIRGÉ,

Assistant Chief Engineer Public Works.

For complete list of plans furnished and dates thereof, see next sheet.

LIST of Plans furnished.

	Names of Harbours, &c.	When Furnished.	County.	Province.
1	Beaver Harbour.....	April 15, 1872.	Charlotte.....	New Brunswick.
2	Shippagan Gully.....	April 22, 1872.	Gloucester.....	do
3	Aspee Bay.....	August 27, 1872.	Victoria.....	Nova Scotia.
4	South Ingonish.....	July 22, 1872.	do	do
5	Grande Anse.....	August 27, 1872.	Inverness.....	do
6	Cheticamp Harbour.....	do	do	do
7	Margarie Harbour.....	do	do	do
8	Chimney Corner Harbour.....	do	do	do
9	Wallace River profile.....	do	Cumberland.....	do
10	Parrsborough Pier.....	do	do	do
10 1/2	Maitland	August 26, 1871.	Hants.....	do
11	Oak Point.....	August 27, 1872.	Kings.....	do
12	Well's Cove.....	do	do	do
13	Baxter's Harbour.....	do	do	do
14	Hall's Harbour.....	do	do	do
15	Canada Creek.....	do	do	do
16	Harborville.....	do	do	do
17	Morden or French Cross	do	do	do
18	Little Clam Cove.....	do	do	do
19	Port Williams or Port Lorne.....	July 22, 1872.	Annapolis.....	do
20	Margaretville.....	August 27, 1872.	do	do
21	River Sissibee.....	do	Digby.....	do
22	Meteghan.....	July 22, 1872.	do	do
23	Digby Pier.....	August 27, 1872.	do	do
24	Green Cove or Maitland.....	do	Yarmouth.....	do
25	Yarmouth.....	do	do	do
26	Grand River.....	.....	Richmond.....	do
27	Cape George (McNair's Cove).....	August 7, 1871.	Antigonish.....	do
	Prepared by J. E. Boyd, 7th Aug., 1871.			
28	Ragged Head.....	August 27, 1872.	Guysborough....	do
29	Larry's Harbour.....	do	do	do
30	Brooklyn.....	August 24, 1871.	Queen's.....	do

TIME of High Water, Full and Change, Rise of Spring and Neap Tides at the various localities examined, &c., and where situated.

No.	County.	Member of House of Commons.	Port or Harbour.	Province.	Description— See Sheet	High Water, Full and Change.		Rise of Spring Tides.		Rise of Neap Tides.		Remarks.
						H.	M.	Ft.	In.	Ft.	In.	
1	Charlotte.	John Bolton.....	Beaver Harbour.....	N.B..	A.	11	19	23	6	20	.....	N.W. side Bay of Fundy.
2	St. John.	Lt.-Col. Hon. J. H. Gray.	Quaco.....	do ..	B.	11	35	30	.....	25	.....	do
3	Gloucester.	Hon. J. W. Anglin..	Bathurst.....	do ..	C.	3	15	7	.....	4	.....	S. side of Baie des Chaleurs,
4	do	do	Shippagan.....	do ..	D.	3	40	5	6	3	.....	towards Centre of Bay.
5	Northumberland	Hon. R. Hutchinson.	Richibucto.....	do ..	E.	.....	.....	4	.....	2	6	S. side of Baie des Chaleurs,
6	Victoria.	Wm. Ross.....	Cape North.....	N.S..	F.	.....	.....	.....	.....	.....	.....	at lower end of Bay.
7	do	do	Aspee Bay.....	do ..	G.	7	30	6	.....	4	0	W. side of Northumberland Strait.
8	do	do	South Ingonish.....	do ..	H.	8	11	3	11	2	9	Northernmost extremity of Cape
9	Inverness.	H. Cameron.....	Grande Anse.....	do ..	.....	.....	.....	.....	.....	.....	.....	Breton, at outlet of Gulf St.
10	do	do	Cheticamp.....	do ..	I.	8	15	3	6	2	.....	Lawrence, into Atlantic Ocean.
11	do	do	Margerie River.....	do ..	J.	8	40	3	6	2	.....	N.E. end of Cape Breton on
12	do	do	Chimney Corner.....	do ..	.....	.....	.....	.....	.....	.....	.....	Atlantic Ocean.
13	do	do	Mabou.....	do ..	K.	9	0	4	.....	2	.....	do
14	do	do	Port Hood.....	do ..	L.	9	0	4	6	2	.....	N.W. side of Cape Breton, on
15	do	do	Smith's Island.....	do ..	.....	.....	.....	.....	.....	.....	.....	Northumberland Strait.
16	Cumberland	H.G. Piner.....	Wallace Harbour.....	do ..	M.	10	30	8	.....	5	.....	do
17	do	Dr. Stewart Town- shend.	Parrsborough.....	do ..	.....	11	50	.....	.....	.....	.....	S. side of Northumberland Strait.
18	Westmorland	do	Cumberland Basin.....	N.B..	.....	11	55	45	.....	.....	.....	N. side of Mines Basin.
19	do	do	Baie Verte.....	do ..	.....	9	.....	4	.....	2	.....	North or upper end of Bay of
20	Hants.	Hon. J. Howe.....	Hantsport.....	N.S..	.....	12	30	48	.....	40	.....	Fundy.
21	do	do	Maitland	do ..	.....	12	41	50	6	43	6	S. side of Northumberland Strait.

22	Kings.....	L. D. V. Chipman.....	Oak Point.....	do ..	do ..	11	40	.....	.....	.....	.....	W. side of S. end of Mines Basin or Minas, and at outlet of Avon River. S.E. side Mines or Minas channel and Bay of Fundy.
23	do	do	Little Clam Cove.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
24	do	do	Scott's Bay.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
25	do	do	Well's Cove.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
26	do	do	Ross Creek	do ..	do ..	.....	.....	.....	.....	.....	.....	do
27	do	do	Bennett's Cove	do ..	do ..	.....	.....	.....	.....	.....	.....	do
28	do	do	Black Hole.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
29	do	do	Baxter's Harbour.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
30	do	do	Hall's Harbour.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
31	do	do	Chipman's Brook.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
32	do	do	Canada Creek.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
33	do	do	Harborville.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
34	do	do	French Cross or Morden Cross.....	do ..	do ..	.....	.....	.....	.....	.....	.....	do
35	Annapolis	W. H. Ray.....	Margaretville.....	do ..	N.	11	.....	.....	.....	.....	.....	do
36	do	do	Port Williams or Port Lorne	do ..	O.	11	.....	.....	.....	.....	.....	do
37	Digby	A. W. Savary.....	Meteghan Harbour	do ..	.....	10	43	.....	.....	.....	.....	E. side St. Mary's Bay, at mouth of Bay.
38	do	do	Sissiboo River at Weymouth	do ..	P.	10	43	20	9	17	.....	N.E. side St. Mary's Bay, about midway up Bay.
39	do	do	Digby.....	do ..	.....	11	.....	27	6	23	.....	At lower or S.W. end of Annapolis Basin.
40	Yarmouth.....	F. Killam.....	Green Cove or Maitland	do ..	.....	10	9	.....	.....	.....	.....	At southern end of Nova Scotia, on Atlantic Ocean.
41	do	do	Yarmouth	do ..	Q.	10	9	16	.....	13	.....	do
42	Richmond	Hon. LeViscomte.....	Grand River.....	do ..	R.	.....	.....	.....	.....	.....	.....	At S.E. end of Cape Breton, on Atlantic Ocean.
43	do	do	St. Peter's Bay	do ..	S.	7	30	6	.....	4	.....	At outlet of Bras d'Or Lake, on S. coast of Cape Breton.
44	Antigonish.....	Hugh McDonald.....	Cape George (McNair's Cove.)	do ..	T.	.....	.....	.....	.....	.....	.....	W. side of St. George's Bay, Northumberland Strait.
45	do	do	Arisaig.....	do ..	U.	10	6	5	3	3	.....	S. side and towards lower end of Northumberland Strait.
46	Guyssborough	Hon. Stewart Campbell.	Chedabucto Bay.....	do ..	V.	8	50	.....	.....	.....	.....	At lower or S.E. end of Strait of Canso.
47	do	do	Ragged Head.....	do ..	W.	8	50	5 to 8	.....	.....	.....	N.W. side of Chedabucto Bay.
48	do	do	Guyssborough	do ..	.....	8	20	6	6	4	.....	At W. or upper end of Chedabucto Bay.
49	do	do	Larry's Harbour, Tor-Bay.....	do ..	X.	8	0	6	.....	4	.....	On South coast of Nova Scotia, Atlantic Ocean.
50	Queen's.....	J. H. Forbes.....	Liverpool Harbour.....	do ..	Y.	7	52	7	4	5	.....	On S.W. coast of Nova Scotia, Atlantic Ocean.
51	do	do	Little Hope Island.....	do ..	Z.	7	30	.....	.....	.....	.....	Opposite S.W. coast of Nova Scotia, Atlantic Ocean.

NOTE.—Description of Harbours, etc., from A to Z, inclusive, appended to original manuscript, not published herewith.

GENERAL QUESTIONS addressed by the undersigned to various parties, in each locality, during time of examination, respecting Harbours, Maritime Provinces, referred to in this Report:—

1. Population of town or village in 1871?
Population of county?
2. Exports consist of? Tons of?
3. Imports?
4. Exports generally sent to?
5. Imports generally from?
6. Salmon, shad, herring, mackerel, or any other fish taken? Average quantity per year, and where taken?
7. Number of vessels frequenting harbour per year?
8. Tonnage?
9. Number of vessels loaded in harbour per year?
10. Greatest draught of water of largest vessels loaded?
11. Fish. What quantity exported?
12. Minerals consist of?
13. Agricultural products consist of?
14. Prevailing winds, spring, summer, autumn?
15. Wind causing heaviest sea at entrance of harbour?
16. Ice forms inside of harbour or pier?
17. Ice forms outside of harbour or pier?
18. Harbour clear of ice inside?
20. Bottom of harbour inside of pier, sand, gravel, rock or mud?
21. Bottom of harbour outside of pier, sand, gravel, rock or mud?
22. Number of vessels, size, owned in harbour?
23. Number of fishing boats?
24. Harbour capable of sheltering how many vessels of heaviest draught at high water? At low water?
25. Length, breadth, depth, name of river emptying into harbour? Above or below pier, if any?
26. Fog? How often? What months the worst?
27. Seaworms? Any to injure piers? To what extent?
28. Number of vessels or boats fishing off coast?
29. Where do they go for shelter in south-east gales or other gales?
30. Where do they go for shelter in south-west gales or other gales?
31. What wind causes harbour to fill with sand? Inside of pier, or outside?
32. What wind clears the sand away inside? or outside?
33. What wind prevents entrance into harbour? or out of it?
34. What is the best shelter the harbour, or pier, if any, affords as it is? And if there be no shelter, where should a pier or breakwater be placed, and in what direction of the compass, to afford the most shelter and accommodate the greatest number of vessels?
35. Any pier or breakwater near harbour, and at what distance?
36. Does mail steamer, or any other steamer, call at pier or otherwise? Where from, and how often? and with what draught of water?
37. Do any other vessels call at pier? Of what tonnage? For what purpose? And how many per year?
38. When was pier originally built? Its cost?
39. When was pier repaired? Cost of repairs?
40. By whom was pier built? Or repaired?
41. At what stage of tide can steamers or other vessels land at pier? With what draught of water?
42. When end of pier is dry at low water where do vessels wait? And how long before they can land at it?

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43. For what purpose is pier or breakwater proposed to be built? And at what point would it be most serviceable to general navigation and commercial interests?
44. What depth of water is required at end of proposed pier?
45. Can none of the existing piers be used, and, if not, why?
46. If pier is constructed or harbour otherwise improved, will local authorities furnish a road to pier or contribute towards construction of work?
47. What sum is expected to be furnished towards construction of proposed work by the Local Legislature, Company, or otherwise?
48. Is proposed pier or breakwater likely to be injured by floating ice or otherwise?
49. Is channel likely to fill up after it is dredged, and why?
50. Is harbour likely to fill up inside or outside of landing pier or breakwater, and why? and what is the best mode of preventing such filling up, according to past observation?
51. How many vessels built per year? What register tonnage?
52. Pier Company? If any, when incorporated? For how large a revenue?

GENERAL REMARKS.

N. B.—Any further information that may be useful in reference to the subject can be added after the last question is answered.

All answers should be made on separate sheets, and numbered the same as the questions.

Any question not applying to any particular harbour can be noted on the sheets of answers by making a cross or star prefixed to the number.

G. F. BAILLAIRGÉ,

Assistant Chief Engineer of Public Works.

GENERAL Questions respecting Prices of Lumber, Maritime Provinces.

No.	—	Name of Wood.	Size.	Length.	—	What Price.
			Inches.	Feet.		
1	Square timber ...	Pine	12 × 12	30	Per ton	
2	do	do	12 × 12	25	do	
3	do	do	12 × 12	20	do	
4	do	Spruce	12 × 12	30	do	
5	do	do	12 × 12	25	do	
6	do	do	12 × 12	20	do	
7	do	Hemlock	12 × 12	30	do	
8	do	do	12 × 12	25	do	
9	do	do	12 × 12	20	do	
10	do	Yellow Birch	12 × 12	30	do	
11	do	do	12 × 12	25	do	
12	do	do	12 × 12	20	do	
13	do	Maple	12 × 12	30	do	
14	do	do	12 × 12	25	do	
15	do	do	12 × 12	20	do	
16	Round timber ...	Pine	14 diameter at small end.	30	Per stick	
17	do	do	14 do	25	do	
18	do	do	14 do	20	do	
19	do	Spruce	14 do	30	do	
20	do	do	14 do	25	do	
21	do	do	14 do	20	do	
22	do	Hemlock	14 do	30	do	
23	do	do	14 do	25	do	
24	do	do	14 do	20	do	
25	do	Yellow Birch	14 do	30	do	
26	do	do	14 do	25	do	
27	do	do	14 do	20	do	
28	do	Maple	14 do	30	do	
29	do	do	14 do	25	do	
30	do	do	14 do	20	do	
31	do	Fir	6 thick flatted	30	do	
32	do	do	6 do	25	do	
33	do	do	6 do	20	do	
34	do	do	6 do	15	do	
35	do	Spruce	6 do	30	do	
36	do	do	6 do	25	do	
37	do	do	6 do	20	do	
38	do	do	6 do	15	do	
39	do	Hemlock	6 do	30	do	
40	do	do	6 do	25	do	
41	do	do	6 do	20	do	
42	do	do	6 do	15	do	
43	Snubbing posts...	Yellow Birch	16 diameter	10	Each	
44	do	Oak	16 do	10	do	
45	do	Tamarack	16 do	10	do	
46	Top covering, &c	Pine Plank	3 thick		Per M.F., B.M.	
47	do	Spruce	3 do		do	
48	do	Hemlock	3 do		do	
49	Stone delivered..				Per ton	
50	Iron do				do	

1 ton of timber equal to 40 cubic feet.

1 ton of stone equal to $\frac{1}{2}$ cubic yard.

N.B.—If any of the above materials cannot be procured in the locality, state where they can be purchased, and at what price, delivered on the work.

The description of the various harbours from A to Z, inclusive, and the answers to the General Questions respecting each harbour and the prices of materials in each locality, appended to the original, have not been published, being too voluminous.

G. F. BAILLAIRGÉ,

Assistant Chief Engineer of Public Works.

APPENDIX No. 5.

REPORT ON THE PROJECTED

HARBOUR OF REFUGE BETWEEN RIMOUSKI AND FATHER POINT,

On the South Shore of the St. Lawrence, below Quebec.

BY

G. F. BAILLAIRGE,

Formerly Assistant Chief Engineer, now Deputy of the
Minister of Public Works.

(No. 12,295.)

APPENDIX No. 5.

REPORT ON PROPOSED HARBOUR OF REFUGE BETWEEN RIMOUSKI AND FATHER POINT.

OTTAWA, 11th April, 1872.

SIR,—I have the honour to submit you the following Report on the proposed harbour of refuge on the south shore of the St. Lawrence, at a place accessible to Transatlantic steamers and the Intercolonial Railway.

The survey ordered by your letter, dated 29th April, 1870, was commenced in July and finished on the 23rd of November of the same year, and the plan was transmitted to you on the 21st of March, 1871.

This plan comprises the portion of the river between the head of the Island of St. Barnabé and the Parish of St. Luce, three-quarters of a mile below Father Point.

According to the survey that was made and the information obtained in the locality and elsewhere, the only sites suitable are Pointe à Pouliot and Father Point. Their relative advantages can be judged of by referring to the place and by the following:—

POINTE À POULIOT.

In order to obtain a depth of 26 feet of water at low tide, it will be necessary to construct a pier 3,800 feet in length, in a direction N. $35^{\circ} 10'$ W.; to obtain a depth of 32 feet, the length will be about 4,500 feet.

This pier would be protected against the winds from the south, and west-south-west by the Island of St. Barnabé. This island will give but little shelter against the west winds.

A wing of 800 feet, running S. 70° W. at the northern extremity of the pier will protect vessels against the north winds.

During the high winds from the east, north-east, north-west and west, the waves which break upon the pier would rebound over it, and render its approach dangerous and extremely difficult, unless a second pier was constructed on the east or west side of it, which would be too expensive.

It is probable that Transatlantic steamers would not stop at this pier, as it would be out of their usual route. Moreover, during the high winds from the east, north-east and north, or during times of fog or snow, steamers would be afraid to pass too near the shoals of the Island of St. Barnabé, which are in proximity to the route they must follow on starting from or arriving at the pier.

FATHER POINT.

A pier placed here, in a north-westerly direction, which is the most favourable would attain a depth of 26 feet of water at low tide at the end of 1,700 feet, and a depth of 32 feet at the end of 2,170 feet, but it would be more exposed to the action of the waves, the sea, and the floating ice, than at Pointe à Pouliot.

In order that the Transatlantic steamers or other large vessels might be able to stop here, or elsewhere, on the south shore of the St. Lawrence, at any time, it would be necessary to construct two piers, to a depth of at least 32 feet of water at low tide, in such a manner as to form a harbour, where they might enter either for shelter or to embark or disembark passengers and freight.

The formation of such a harbour, accessible to all vessels without their encountering any shoals on their route and which might be easily connected with the Intercolonial Railway by means of a branch line of about one and three-fourths miles in length, can be made at Father Point more easily, and with less expense, than elsewhere, by constructing the necessary piers in the position indicated by the red lines on the plan.

The west pier would have a length of 2,170 feet, and the east pier a length of 2,220 feet. The space between these two piers would be protected on the south side by the shore, where there is a lighthouse and telegraph office, and on the north side by wings running east and west, for a length of 680 feet, in such a manner as to leave a passage of about 300 feet towards the centre of the basin.

From west to east, this basin would have a breadth of 1,660 feet, in 32 feet depth of water, of 2,300 feet in a depth of 20 feet, and of 2,600 feet in a depth of 10 feet. During extreme low water; from north to south, or from the entrance to the shore, there would be a distance of 900 feet between the line of 32 feet of water and that of 10 feet,—of 450 feet between this and the line of 10 feet, of 350 feet between this line and that of low water, and of 1,000 feet between this last line and that of high water, opposite the fork of the High road leading to the town of Rimouski, to the lighthouse, and to St. Luce; the distance from the line of low water to the rocky point, where the lighthouse is situated, is about 200 feet.

The piers forming this harbour would be exposed to all winds, but when the waves would break upon one of them, the pier on the opposite side would not suffer, and the vessels in the harbor, or seeking its shelter, would always be in safety.

It might be objected that the ice forming between the piers in winter, not being broken to pieces by the winds, or carried away by the current, will not disappear before the month of May, or later. This is true, and would be the case at every other locality on the south shore of the St. Lawrence where an enclosed harbor might be constructed.

The difficulty, however, might be partly obviated by leaving an opening through the eastern and western piers of the basin, towards the north end of the basin; this would also facilitate the entrance and departure of vessels frequenting the harbour.

At Father Point the outside of the piers will probably be free from ice nine and half to ten months out of twelve.

Transatlantic steamers and other vessels could arrive in safety at this harbour from the 1st of April to the 15th of December every year, and often before and after these two dates.

At Quebec navigation does not open generally before the 25th of April, and it closes towards the 25th of November.

RIMOUSKI PIER.

In the event of its being asked, could not this pier be utilized for the purpose in view, my answer would be as follows:—

It would be necessary to prolong this pier to a further distance of 8,300 feet to attain a depth of twenty six feet, and of 8,750 feet to attain a depth of 32 feet of water, at low water, if it extended in its present direction.

The shortest distance from the extremity of the pier, to find the same depths of water, is in a northerly direction, which is the worst on account of the winds from the north and east; in this case it would be necessary to lengthen the pier 5,300 feet to attain a depth of twenty-six feet, and 7,000 feet to attain a depth of thirty-two feet of low water.

Steamers or other vessels could not approach it except in calm weather.

In its present state this pier is about 2,150 feet long, with a depth of water of seven to eight and a half feet at its northern extremity, during low water of spring tides.

PREVAILING WINDS OF EACH SEASON.

According to the observations of Admiral Bayfield, the winds the most frequent and of longest duration are the east winds in the spring. The west winds blow occasionally towards the approach of summer when they are succeeded by the south-west wind, which becomes the prevailing wind nearly the whole of the summer, in all parts of the river and gulf; the wind comes lightly from the south, from time to time, but rarely from the north in summer. Towards the month of September and after the autumnal equinox, the prevailing winds of considerable duration are those from the north-west.

In October and November north-westerly gales, accompanied sometimes by slight storms of hail or snow, are not unfrequent.

In winter the ordinary winds are those from the west and north-west.

TIDES.

During spring tides the variation between the lines of ordinary high and low water is about fourteen feet, between Métis and Bic.

All piers to be built on this part of the south shore of the St. Lawrence should be at least 6 feet above the highest tides.

DISTANCES.

The distances, from the Church of Rimouski in a straight line, are:—

1·89 miles to the pier already built.

3·37 miles to Pointe à Pouliot.

5·25 miles to Father Point.

SOUNDINGS.

During the whole time of the survey the depth of water did not diminish more than two or three times to six inches lower than the line of low water, to which all the soundings shown on the plan are referred.

According to information taken in the locality, the water seldom falls to a lower level, unless once during the year, in the month of April.

ESTIMATE.

The estimate of the probable cost of piers in the different places that were examined in the vicinity of Rimouski, is as follows, 10 per cent having been added for superintendence:—

ESTIMATE OF THE PROBABLE COST OF PIERS AT THE DIFFERENT SITES.

RIMOUSKI PIER.

Extension of the pier of Rimouski on the shortest line to a depth of 26 feet low water.

Total length 5,300 feet, of which 500 of 35, 2,200 of 45, and 2,600 of 55 feet width, with a wing 800 x 55 feet at the northern end.

Probable cost, \$830,000.

POINTE À POULIOT.

If a pier is built, with a wing of 800 feet at its northern extremity, to a depth of 26 feet of water, at low water.

Total length, including the wing, 4,600 feet, of which 3,000 by 35 and 1,600 by 45 feet in width.

Probable cost, \$440,000.

If a pier is built to a depth of 32 feet instead of 26. Total length, including the wing, 5,400 feet.

Probable cost, \$570,000.

FATHER POINT.

For one pier with a wing of 800 feet, similar to that at Pointe à Pouliot. Total length, including the wing, to a water depth of 26 feet, 2,500 feet.

Probable cost, \$340,000.

For one pier built to a water depth of 32 feet. Total length, wing included, 2,970 feet.

Probable cost, \$423,000.

For harbour formed by means of two piers and two wings, as shown on the plan to a water depth of 32 feet.

	Length. Feet.		Breadth at top. Feet.	Height.
West Pier.....	450	x	40	...
do	720	x	50	...
do	900	x	60	...
Wing.....	680	x	60	x 33
	<u>2,750</u>			
East Pier.....	1,500	x	40	...
do	750	x	50	...
do	970	x	60	...
Wing	680	x	60	x 53
	<u>3,900</u>			

Total length of the two piers with
the two wings..... 6,650

Probable cost, \$850,000.

With this report I transmit you, that of my assistant, C. E. Michaud, Civil Engineer, whom I instructed to continue the survey during my absence whilst engaged in the survey for the projected canal between the Bay of Fundy and Baie Verte. He accomplished the work remaining to be done with accuracy and diligence; and with the assistance of Mr. René Steckel and Messrs. Alfred and Felix Hamel, he prepared the plan of the survey which I now transmit you.

I have the honour to be, Sir,

Your very obedient servant,

G. F. BAILLAIRGÉ,

Assistant Chief Engineer.

F. BRAUN, Esq.,
Secretary of Public Works,
Ottawa.

MR. MICHAUD'S REPORT.

OTTAWA, 21st March, 1871.

SIR,—I have the honour to transmit you the following Report on the exploration of the Rimouski Harbour of Refuge, which you intrusted to my direction at the time of your departure for the Baie Verte Canal survey, on the 6th of last August.

After your departure the soundings were continued with as much speed as possible, but we were frequently interrupted by wind, rain and fog.

In order to utilize the men's time, the days on which it was impossible to take soundings, I made the survey of the river and all the houses from the Parish of St. Luce to a point $2\frac{1}{2}$ miles west of the River Rimouski (including the town) for a distance of ten miles.

The survey of the Island of St. Barnabé was also made during days of bad weather.

The soundings were finished on the 15th, and the survey on the 23rd of November.

It was impossible to take the levels at Pointe à Pouliot before the 12th of December, on account of the bad weather and the tide.

The plan was finished previous to our departure from Rimouski, with the exception of the notes that you may wish to add.

Having been nearly always occupied with other work since my arrival at headquarters, it was impossible for me to prepare the report sooner.

Extent of Soundings.

The soundings were taken from about one mile east of Father Point to one and a half miles west of the Island of St. Barnabé, a distance of ten miles. All the soundings extend from low tide to a water depth of 26 feet and more.

Depth of Water.

Between the Isle of Cannel and the west point of the Island of St. Barnabé, the depth of water varies from 7 to 11 feet. A little further west it deepens to 17 feet.

To attain a depth of 26 feet in rear of St. Barnabé Island, it is necessary to go a distance of about one mile, except at the upper end, where the distance is only 2,000 feet.

In order to attain a water depth of 26 feet from the end of the present pier, the shortest distance is one mile, in a direction nearly north.

At Pointe à Pouliot, which is situated nearly midway between the present pier and Father Point, there is a distance of 3,800 feet from the highway to a depth of 26 feet of water.

At Father Point the 26 feet depth of water is at a distance of only 1,500 feet.

Pointe à Pouliot.

According to the examination I made, and the information I received, Pointe à Pouliot, which is protected on the west side by the Islands of St. Barnabé, Cannel, etc., appeared to be the safest and most convenient place for the proposed harbour of refuge.

Vessels can approach, using their fathom line, in seasons of fog or snow, without any danger, there being no obstacles to encounter in the vicinity of this place.

The bottom being of mud, offers the best anchorage that could be desired for vessels.

For a harbour of 26 feet depth of water at low tide, the works required would be as follows:—

1st. A pier 3,800 feet in length, starting from the shore, of which 3,000 feet by 35 feet wide, and 800 feet by 45 feet, running north $35^{\circ} 10'$ west. Of these 3,800 feet, there are, starting from the shore, 1,300 feet of rock bottom where the water seldom rises higher than from 4 to 5 feet.

2nd. A wing of 800 feet in length by 45 feet in width, running S. 70° W. to protect vessels against northerly winds.

SITE.

The most convenient site for this pier, is 6,000 feet eastward from the existing pier at Rimouski.

PROBABLE COST.

The probable cost of the work, including superintendence, would be about \$456,831.

FATHER POINT.

Although the distance at this place is the shortest to attain 26 feet depth of water, it would cost, nevertheless, as much, if not more, to make a harbour of refuge, than at Pointe à Pouliot. Being exposed to all the winds, it would be necessary to construct two piers, starting from the land, with wings, so that vessels might find a shelter.

DATUM.

The number 21 marked on the gauge, was taken for the *datum*, according to which all the soundings were reduced, as indicated on the plan. During the whole course of the summer, the water did not fall lower, except two or three times, than 6 inches below this *datum*. This, I was assured, was the lowest, excepting once a year, in the month of April, when it lowers sometimes 3 feet more.

It will be necessary, therefore, to subtract 6 inches from all the soundings on the plan, in order to obtain extreme low water.

WINDS.

Spring.—The winds which prevail during this season are those from the east and north-east, from the 15th of April to the month of May.

Summer.—During this season the most frequent winds are generally from the west-south-west, varying to the south-west.

Autumn.—The winds are generally easterly for two or three days during this season, turning to the north-west and west.

Winter.—After one or two calm days, it is generally an east wind, which lasts from 24 to 48 hours, and afterwards turns to north-west and to west.

ICE.

Between the town of Rimouski and the Island of St. Barnabé, the ice takes between the 15th and 20th of December.

From the Island of St. Barnabé downwards, floating ice generally appears towards Christmas, and sometimes not before the 15th of January, and remains between the east point of the Island of St. Barnabé and Rimouski pier until the 15th and 20th of January.

The portion between Rimouski Pier and Father Point is not covered with stationary ice before the end of the month of February for periods of about fifteen days.

The width of the ice at Pointe à Pouliot is about one and one-half miles. At Father Point the ice is nearly one mile in width.

Between Rimouski Pier and Father Point the ice disappears towards the beginning of March, and returns with the north and north-east winds for a short time, but does not remain stationary.

Between the town and the Island of St. Barnabé the ice generally disappears towards the 15th of April, but very seldom later and sometimes sooner. In the month of January, last year, the ice was all gone as far as the bridge of the Rimouski River, but this happens very seldom.

Before concluding allow me to make the following remarks on the mode employed in the construction of piers at the present day:—

1st. I observed last summer, and especially during the autumn, that the upright fenders usually placed on each side of the piers are more disadvantageous than useful.

These fenders in the first place are dangerous to vessels. They offer, moreover, so many points of resistance against which the waves of the sea break and afterward rebound over the top of the pier, carrying away the ballast and all that may happen to be upon the pier. I witnessed this several times.

2nd. I do not see the utility of the two or three tiers of platforms that are usually placed the whole length of the piers; on the contrary I think it is a great fault.

There is no necessity to put more platforms than are required to receive the stone necessary for the sinking of the cribs.

For a crib of twenty-four compartments, for example (by compartments I mean the spaces comprised between the longitudinal ties and the cross ties), no more than one platform should be put in to four or five compartments. The stone filling in the other space, after the sinking of the crib, would then rest on the bed of the river, no matter what its inequalities might be, and the wood work would then be relieved of a portion of the weight, and be less liable to be undermined or to sink more on one side than on the other, as was the case with the Rimouski Pier.

You will find herewith—

1st. An estimate of the cost of the proposed pier.

2nd. A list of materials with the prices at which they can be procured at Rimouski.

3rd. A copy of a portion of the plan showing the situation and form of the proposed pier at Pointe à Pouliot.

4th. A profile of the ground where this pier is represented on the copy of the plan.

I have the honour to be, Sir,

Your obedient servant,

C. E. MICHAUD.

G. F. BAILLAIRGÉ, Esq.,

Assist. Chief Engineer Public Works,
Baie Verte, N.B.

Estimate of probable cost of a pier at Pointe à Pouliot 4,600 feet in length.

Above Low Water.

Feet.		Feet.		Feet.		Cubic Yards.
3,000 long	x	37.50	x	18.....		75,000
1,600 "	x	47.50	x	18.....		50,666

Below Low Water.

1,730 "	x	40	x	15.....		38,444
800 "	x	26.50	x	50.....		39,259
800 "	x	29	x	50.....		42,937

Landing Place.

160 "	x	33	x	10.....		1,955
40 "	x	24	x	10.....		355

Total.....		248,616	
At \$1.75.....			\$435,078
Add 5 per cent. for superintendence and costs.....			21,753
Total.....			<u>\$456,831</u>

C. E. MICHAUD.

List of Materials, with the prices at which they can be procured at Rimouki.

Description of Materials.

				\$	Cts.
Square Pine, 12	x	12 (per foot).....		0	10
" Cedar, 12	x	12 ".....		0	08
" Spruce, 12	x	12 ".....		6	06
Flatted Pine, 10	x	12 ".....		0	08
" Cedar, 10	x	12 ".....		0	07
" Spruce, 10	x	12 ".....		0	05
Pine deals, 3 inches thick (per hundred).....				14	00
Red Spruce, 15 long	x	18 diameter (per stick).....		2	50
Stone for ballast, (per toise).....				3	00
Gravel, (per load).....				0	12

REMARKS.

The original plan submitted with this Report was handed to Sandford Fleming, Esq., C. E., by order of the Department, and was destroyed by fire when the railway offices were burned. A trace copy had been commenced and partly completed when the original copy was sent to Mr. Fleming. It may probably be completed from the notes in my hands. There is a reduced copy of the general plan showing the contour lines of 10, 15, 20 feet, etc., during ordinary low water springs. This plan was prepared by Messrs. Taché and Boulay, two of my assistants.

G. F. BAILLAIRGÉ,

Assistant Chief Engineer of Public Works.

23rd February, 1876.

APPENDIX No. 6.

REPORT ON THE IMPROVEMENTS IN
QUEBEC HARBOUR SINCE CONFEDERATION.

On the Graving Dock at Lévis, and on the Operations of
the Lifting Barge.

BY THE QUEBEC HARBOUR COMMISSIONERS.

APPENDIX No. 6.

REPORT ON QUEBEC HARBOUR.

No. 30776.

HARBOUR COMMISSIONERS' OFFICE,

QUEBEC, 4th January, 1883.

SIR,—I have the honour to transmit you herewith the two General Reports asked for in your letter of the 11th ultimo.

I have the honour to be, Sir,

Your most obedient servant,

A. H. VERRET,

Secretary Treasurer.

F. H. ENNIS, Esq., Secretary,
Public Works Department,
Ottawa.

QUEBEC HARBOUR WORKS.

QUEBEC, 30th December, 1882.

The Board of Harbour Commissioners as at present constituted was appointed under Act 22 Vict., cap. 32, 1858, and commenced with a debt of \$723,000 for works completed by the old Commissioners, viz.: the Pointe à Carcy, or Commissioners' Wharf, and the ballast wharf or breakwater, the former, with its stores, costing \$270,000, and the latter \$215,000, with other miscellaneous charges.

The works at present in progress and advancing towards completion are, firstly, a design for harbour improvements now known as the "Princess Louise Embankment" and "Docks," and, secondly, a large graving dock on the south or Lévis side of the St. Lawrence, called the "Lorne Graving Dock."

Works of improvement in this direction had been discussed under various aspects for years by the Harbour Commissioners and others interested, but it was not until designs were called for these purposes in 1874 that any definite scheme was determined upon for harbour improvements, when a selection was made of the *embouchure* of the River St. Charles for the purpose of constructing a tidal basin and wet dock as the first of a probable series of such accommodation in this locality.

Acting under a Minute of the Privy Council of Canada, approved by His Excellency the Governor General, in accordance with the provisions of the 17th section of the Act, 36 Victoria, Cap. 32., the construction of certain works there was finally determined upon.

The first section of these works, now nearly complete, forms the centre embankment of a scheme for double wet docks and tidal basins on either side of it; the embankment itself having a length of 4,000 feet by a breadth of 330 feet, extending from the gas-house wharf to the end of the formerly isolated mole or breakwater already sunk in fifty feet of water, and known as the ballast wharf.

This somewhat unique structure was constructed in the years 1866 and 1867, at a cost of \$215,589, by the Harbour Commissioners, as a first step in the direction of improvement, partly with a view to its affording shelter to wharves along the Palais

from the north-east, and as a means of utilizing the ballast from ships arriving in port, instead of depositing in the river in what was known as "ballast ground."

This valuable commencement of these works has fully answered all the expectations connected with it. It is now full, and has recently had its coping and general surface level brought to the same structural height of 6 feet above high water spring tides, as the coping level of the masonry of the quay wall of the tidal basin, of which it forms a principal initial part.

From the ballast wharf, on the south side of the "Louise Embankment," along its entire length a quay wall, having a crib work and concrete foundation, with a masonry superstructure, has been constructed with a preliminary channelway of 150 feet in width; of this channelway, 1,250 feet in length is to be dredged to 26 feet at low water from 23 to 24 feet, and the remaining 2,160 feet to a depth of 13 feet at low water.

There being a rise of 18 feet at spring tides and 13 feet at neap tides, the least normal depth of float water will, when these works are complete, eventually be 26 feet in both the tidal basin and wet dock respectively.

The first section of the quay wall, 1,250 feet in length, forms one side of the enclosed area of the wet dock, of which three sides are now complete, and will contain an area of twenty acres, and the 2,160 feet of the second section forms one side of the enclosed area of the wet dock, three sides also of which are complete and will contain an area of forty acres; the whole representing an entire water area of sixty acres.

Work was begun under contract for the completed first section of these works in May, 1877, and was continued during each working season to the end of November, 1881, when it was determined to commence under a new contract for the remaining section of the works.

The total expenditure on works under contract amount to \$734,555.76, and the expenditure on miscellaneous items to \$160,029.55.

GRAVING DOCK.

"The Lorne Graving Dock" is situated at St. Joseph de Lévis, on the southern shore of the St. Lawrence.

This site was selected by the Engineers, appointed and approved of by the Chief Engineer of the Public Works Department, Ottawa.

The general plan of this dock is a rectangular figure of 500 feet by 100 feet, having a circular head of 31 feet radius with a square offset on each side of 19 feet, forming the top width of the timber slides and stairs, which are placed in pairs side by side at either end in a longitudinal direction.

The width of the inner invert between the main body of the dock and the caisson berth is 18 feet. Thus the total length of the dock inside the first meeting face of the caisson berth is 550 feet, and inside the outer meeting face where the caisson can on occasion requiring it, be placed 582 feet. Beyond which the wing wall extends for 140 feet.

The depth of water on the sill is 26 feet 6 inches, at high water spring tides, and 20 feet 6 inches, at high water neap tides, and the entrance width 62 feet.

This dock closes with a travelling caisson worked by an auxiliary engine of 14 horse-power, also used for working the small pumps in clearing the drainage well, when the dock is in use. These pumps having a capacity of 600 gallons a minute.

The main pumps are two in number of 4 feet in diameter and a 5 feet stroke, and are capable of discharging 450,000 cubic feet in four hours at the rate of fifteen strokes a minute.

The engines are 75 horse-power, having three cornish boilers to match, of first class workmanship.

At high water spring tides, this dock can take in the largest trading steamships now built.

One leading feature connected with the dock is that it is under drained as well as surface drained by a system of arterial drains mutually connected and discharged by one main into the drainage well, by which the walls and bottom are relieved of all hydraulic pressure, and frost can have no means of causing upheaval or failure of joint, which has proved so damaging elsewhere.

The dock is constructed of a heavy chrystalized limestone, from Terrebonne on the North Shore Railway, the scantling or dimensions of the stone being exceptionally large, capable of resisting any ordinary pressure and forming with the Portland cement concrete and joint a solid mass. This work was undertaken under Act 38 of Victoria, Chap. 56, by which an expenditure of \$500,000 was authorized, but a further sum will be required to pay certain incidental charges, since accruing and not foreseen, nor estimated for at the date of the above appropriation.

WOODFORD PILKINGTON,

Resident Engineer, Harbour Commissioners

GENERAL REPORT ON LIFTING BARGE.

QUEBEC HARBOUR COMMISSION.

QUEBEC, 30th December, 1882.

The question of building a craft that would clear the obstructions in the way of the navigation in the Harbour of Quebec was discussed for a long time before it was realized.

Obstructions known as nests of anchors and chains had become so numerous and so large that it was considered almost impossible for a vessel to drop her anchor in the harbour without running the risk of loosing them.

At the request of all parties interested in the welfare of the harbour, the Government obtained from Parliament, in 1874, an appropriation of \$25,000 for the construction of a lifting barge to remove the obstructions in question.

The Harbour Commissioners of Quebec were intrusted with the building of the barge.

The barge was built in 1874-75 by Messrs., F. Martineau & Co., according to the plans and under the direction of Messrs. John Dick, Port Warden, and William Simons, Naval Architect.

In perusing the following specification of the barge, it is easy to establish that nothing has been spared to build a craft that would have all the necessary strength to perform the work she was intended to execute.*

* Specification omitted.

The barge was completed during the summer of 1875, and, when equipped and ready to begin her work, she had cost \$35,184.56.

With the raising capacity of four hundred tons, she has proved to be a perfect success.

She only worked few weeks during the fall of 1875, and succeeded in raising four anchors, and 250 fathoms chain.

During the whole seasons of 1876, 1877, 1878, 1879, 1880 and 1881, the barge was engaged in clearing the obstructions in the harbour, whose operations gave the following results:—

In 1876, fifty-seven anchors, and about 1,425 fathoms of chain were secured.

In 1877, 101 anchors, and 3,291 fathoms chain.

In 1878, eight anchors, ninety-six fathoms chain, eighteen boulders, the wreck of the steamer "Bidder," and about one-fourth of the wreck known as "L'Original French vessel sunk in the harbour since October, 1750, according to the *Jesuit Journal*.

In 1879, three anchors, 101 fathoms chain, 121 boulders, and the remainder of the wreck known as "L'Original".

In 1880, 375 boulders, four anchors, 195 fathoms chain, one block stone, one piece oak—forty feet, fifty pieces copper, and one flat iron knee.

In 1881, forty-seven anchors, 1,660 fathoms chain, ninety-six boulders, and one piece oak.

RECAPITULATION.

224 anchors.

7,018 fathoms chain.

610 boulders, weighing 1,957 tons.

Wreck of the steamer "Bidder."

Wreck of the ship "L'Original."

One block stone.

Two pieces oak.

One flat iron knee, and fifty pieces copper.

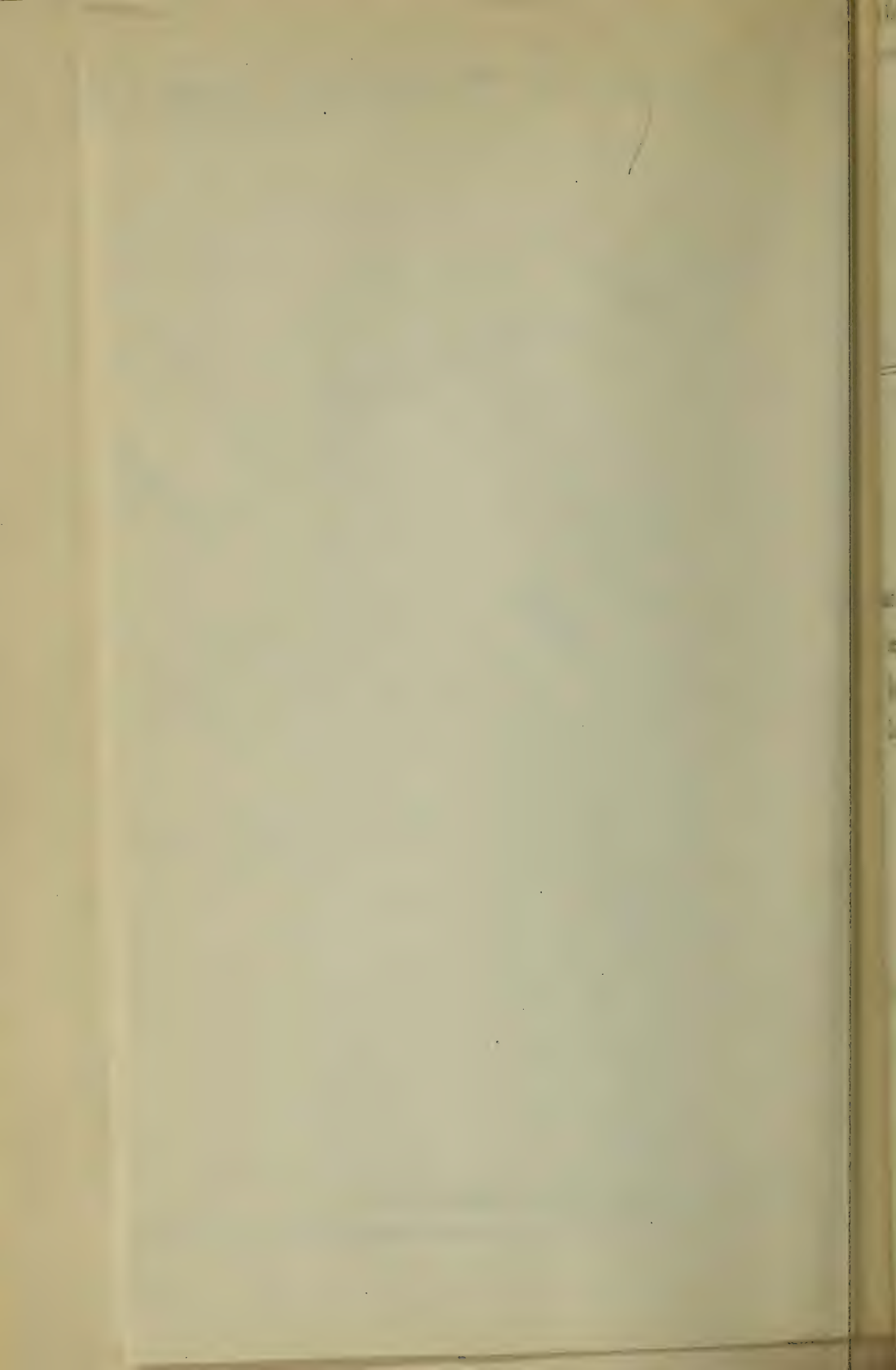
With the exception of the boulders, which were raised in a comparatively small depth of water, the raising operations were all performed in a depth varying from fifteen to thirty fathoms, in a tideway running at the rate of four knots to the hour.

The expenditure connected with the barge has been as follows:—

In 1875.....	\$ 1,735 29
" 1876.....	15,301 79
" 1877.....	11,766 09
" 1878.....	10,535 23
" 1879.....	9,832 73
" 1880.....	7,885 84
" 1881.....	9,991 11
" 1882, expenses connected with sale of remainder of anchors and chains in hand, etc.....	580 50
Total.....	\$67,648 49
Less amount received per sale of anchors and chains, etc.	12,275 34
Total expenditure.....	\$55,373 15

A. H. VERRET,

Secretary Treasurer, Q. H. C.



APPENDIX No. 7.

REPORT respecting the Formation, Motion, Breaking-up, etc., of the Ice, and the Prevailing Currents and Winds in the Harbour of Quebec, as affecting the Navigation in connection with the Location of the Projected Graving Dock.

BY

R. STECKEL,

Assistant Engineer, Department of Public Works.

APPENDIX No. 7.

PROVINCE OF QUEBEC.

QUEBEC.

REPORT RESPECTING THE FORMATION, MOTION, BREAKING UP, ETC., OF THE ICE, AND THE PREVAILING CURRENTS AND WINDS IN THE HARBOUR OF QUEBEC, AS AFFECTING THE NAVIGATION OF THE ST. LAWRENCE, IN CONNECTION WITH THE LOCATION OF THE PROJECTED GRAVING DOCK.

The whole according to personal observation and local information obtained during the winter season of 1875-1876, as requested by John Page, Esq., Chief Engineer of Public Works, Canada.

At Quebec the frost sets in with sufficient severity and tenacity to convert the surface water of the River St. Lawrence into permanent ice, which increases daily in strength and quantity as we advance into winter, every year as early as from the 15th to the 25th of November, or say, on an average, on the 20th of November. Under ordinary circumstances it requires but a few days, at this season of the year, for the coves, the St. Charles estuary, and in general all the sheltered foreshores on both sides of the river, to be covered over with a solid, sound sheet of ice, varying in thickness according to the intensity of the cold, and the less or greater agitation of the water by wind during its formation; but strong enough, however, to practically close up navigation in these localities until the coming spring.

I am informed that last year (1875) winter traffic was carried on across the mouth of the St. Charles in the first days of December; the cores between Diamond harbour and Pointe à Pizéau were frozen over, for a considerable breadth, at about the same time, and the inhabitants of the Island of Orleans came to the city on or about the 9th of December, which is allowed, however, to be an uncommonly early date.

While comparatively sheltered places are thus gradually covered over with an icy crust, extending daily further out from the shore, the ice which is continually being formed in the open stream, mostly towards the time of slack water, together with that which is detached by the disintegrating action of the surf, the waves, and the currents, from the more exposed portions or projecting points of the river banks, and broken up into fragments of all sizes, collects on the water surface into large patches or fields. If the weather continues severe for several days in succession, these "flocs," after having been repeatedly swept past the same spots by the recurring tides, and tossed to and fro on the lee shore by the prevailing winds, finally choke up the entire width of the navigable river channel. They are the more densely packed, jammed against and piled upon each other as the waterway grows narrower; the open spaces which separate one patch from another getting, on the contrary, larger and more numerous as the channel widens out.

When the St. Lawrence becomes so thickly covered with floating ice that at a given moment, owing to its excessive accumulation, a horizontal arch, capable of resisting, temporarily, the downward pressure, is formed in the narrow gorge through which this stream flows near its junction with the river Chaudière, the result is an ice bridge cemented by frost to the numerous boulders on the rugged abutting shores; this is called the "Sault Bridge," or simply the "Sault," on account of its contiguity to the falls of the last named river near its outlet on the south shore.

Instead of being formed during a succession of cold days, the bridge at the "Sault" takes also after very mild weather followed by a heavy thaw and rain with

easterly wind, such as we have experienced from the 29th of December, 1875, to the 1st of January, 1876. During this general thaw the key of the bridge was formed, on the 30th of December, by a single heavy sheet of ice, detached from the Portneuf flats, being wedged in between the opposite shores at the narrow spot above alluded to. Nearly every year the key at the "Sault" is formed two or three times before the bridge assumes a permanent character; last year, in 1875, it took and broke alternately not less than five times, at different dates in December, before it could resist the pressure brought to bear against it from above.

Once the key bridge is secure at the "Chaudiere Sault," below Cap Rouge, the St. Lawrence becomes rapidly covered with a solid crust of ice, thence up to Montreal. This frozen crust is generally rough at the surface from one end to the other of this great highway of navigation, occasionally it is divided into rough and smooth stretches, alternating with each other, and one year, I am told, it assumed a perfectly smooth surface, the whole distance from Cap Rouge to Montreal.

The maximum thickness of the ice above the "Sault" is variously estimated at from twenty to thirty feet judging by the protrusion above the water surface of the heavy blocks which sometimes stick to the ground, while the tide is ebbing, on the borders of the channel where the depth is approximately known. Observations were made in order to collect reliable data for estimating, with some degree of accuracy, the thickness of the blocks or cakes of ice passing down the St. Lawrence after the breaking up of the Cap Rouge ice bridge. Both the immersed and the total depths of several heavy cakes of ice, of various sizes, including the upper crust of the wetted icy snow, were measured on the 1st of May, and found, on an average, to bear to each other the ratio of 87 to 100. The heaviest blocks seen floating were, on an average, five feet above the water surface, their total thickness must therefore have been about ten feet, according to the above experiments. In one instance the actual thickness of a block, which grounded opposite Wolfe's Cove, was directly ascertained to be thirty-six feet, by sounding the depth of water close to it.

In calm weather, before the Cap Rouge, or "Sault," bridge was permanently fixed, the river was more or less densely covered with floes of ice during the entire ebb and flow of the tide. After the "Sault" bridge is fixed, most of the floating ice moves upward and downward during the latter half of the flood and the first half of the ebb tide; the river is clear for an hour or more before and after the time of low water, unless a north-easterly gale should accelerate the upward movement of the floes and prevent their return downward with the outgoing tide, or when a westerly breeze affects their progress in the opposite direction.

The permanent formation of an ice bridge opposite the city of Quebec seldom occurs before the St. Lawrence is frozen over westward from the Chaudiere River. In such case a strong sheet of ice forms the key bridge during a calm, cold night, between the Harbour Commissioners' breakwater, on the north side, and the upper end of Glenburnie Cove, or Hall's wharf, on the south side of the river. This key bridge gains the following day in strength and extent in proportion to the duration and intensity of the cold snap, becoming sufficiently firm before high tides and winds come on to resist the same successfully.

Since the establishment of a regular steam ferry service during winter, an ice bridge formed under the above conditions has very few chances of permanency, the ice being cut up daily and nightly by the steamers. Several times, last winter, I saw a continuous sheet of ice, covering the St. Lawrence between the last named localities as far down as Patton's mill on the Levis shore; but this was always destroyed shortly after its formation either by the wind, the current, or the steamboats.

Before the winter steam ferry was established, and when a permanent ice bridge was formed, as above described, although no attempt was made to destroy it artificially, it was invariably broken up in a short space of time by northerly winds, currents and the tides from below Patton's mill up toward Charland's ship yard, or to a point say one-fourth of a mile above the Government wharf.

When a jam takes place at Pointe a Carey during an easterly storm, before the St. Lawrence is definitely choked up at the narrow pass called the "Sault," the water, thickened by snow, tends to consolidate the accumulated cakes and floes into one continuous rugged ice field, which the frost readily converts into a homogeneous solid crust from shore to shore.

It appears that in 1874-75 a bridge of this description held firm, notwithstanding the efforts of the steamboats to destroy it; nor was it sensibly affected by the winds, tides, or currents until the general breaking up of the ice in the spring. This bridge extended downwards as far as Patton's wharves, immediately below the Government wharf at Levis, and upwards only to about Hunt's wharf, on the north side, where a large open space intervened between it and the upper ice bridge, allowing of the ferry service to be performed regularly by steamers, during the greater part of the winter season.

No matter in what particular manner an ice bridge may take in front of Quebec City, it always moves off in advance of the "Sault" bridge; nevertheless navigation cannot be considered to be really open before the upper ice has cleared out. Any vessels arriving in the Harbor of Quebec, prior to the breaking up of the River St. Lawrence ice above Cap Rouge, generally put up temporarily at Indian Cove, Levis as was done by the steamship "Polynesian" this spring, in order to avoid the danger of being injured by the floating masses of "hummock" ice, which would be packed close to the city wharves in case strong easterly or south-easterly winds should prevail during their downward movement. On an average, two or three tides are sufficient to carry off definitely to sea, the great bulk of the ice accumulated in the river above the harbor of Quebec.

From personal observations made during the past winter, when the River St. Lawrence remained open below the "Chaudière" pass—where it freezes over every year—I find that the foreshores are covered with heavy ice, more or less continuous, as far as the outer ends of the wharves, and slightly beyond the detached mooring piers, wherever these exist, viz.: on the north shore, from the foot of the "Sault" bridge to Pointe à Pizeau and from Diamond Harbor down to Alford's Wharf, which is situated on the north side of Finlay Market Square, and also on the south shore from the "Sault" towards the St. Lawrence Tow Boat Company's piers; at some of the exposed spots, such as above Archer's Mills on the Quebec side, and the Glenburnie Cove on the Levis side, the frozen borders recede closer towards high water mark.

This year a solid crust of thick ice extended from outside of the mooring pier at Diamond Harbor, up to the outer ends of the wharves at Pointe à Pizeau, and covered the shore outward to a slightly concave line drawn between the above named points. The Ply Bank, and all sites that might be proposed for a graving dock in the adjoining coves, were thus shut out from navigation up to the 15th of 18th of April; the lower portion of the bay, at Lampson's Cove was accessible a few days before the upper portion.

From Alford's wharf down to the Commissioners' breakwater, the ice crust extended for a long time a considerable distance beyond the wharves and some 700-900 feet east of the breakwater point, but it moved away gradually, until at the end of March none was left; the approaches to these piers were afterwards comparatively clear, if we except some days during which a strong north-easterly wind had been blowing steadily, when the floating ice, as usual, got temporarily packed along the north shore.

From above the St. Lawrence Tow Boat Company's piers to below Patton's mill there is open ice or perhaps more correctly speaking, open water, nearly during the whole of the winter; the foreshores are occasionally cleared up to near high water mark. In the early part of this season, it happens that after heavy thaws, blocks of hummock ice, which have been detached from the flats above, are grounded in the vicinity, as was observed between the 17th and 24 December, 1875, and temporarily obstruct the approaches to the shore for a few days; northerly winds sometimes drive and pack the "floes" close inshore with some force. In either case, however,

the ice remains stuck fast but a short time, before being broken up anew by the winds and currents, and floated out into the channel by the tides.

If the graving dock is constructed on the site near the Government wharf at Levis, the entrance should be protected, upon its upper side, against cross currents, by means of a guide pier extending some 400 feet beyond the outer end of the wharf, in order to facilitate the ingress of vessels into the dock. The depth of water along this projected pier, which will be likely to cause the formation and accumulation of ice between it and the outer end of the dock, is 12 to 13 feet at ordinary low water spring tides.

In addition to this work it may probably be found necessary to construct a deep water mooring pier some 1,500 feet from the shore where vessels arriving at low water, can wait until the tide rises to the required entrance level of the dock.

Although the graving dock at the Government wharf site of Levis would be generally accessible during the whole of the winter season, judging from the observations made last winter, it does not appear that docking operations can be counted on at this site, nor at any of the other sites, from the latter end of December to the end of March, in such a climate as that of Quebec.

With respect to the closing of navigation at this site, although the frost is no doubt equally severe on both sides of the river, I am informed, by the captains of some of the steam tugs, that they tow barges on the south shore from the St. Lawrence Tow Boat Company's piers, down to the lower end of Indian Cove, some two weeks later in the fall than in the river St. Charles estuary.

The Indian Cove site, below Gilmour's long wharf, recommended by Messrs. Kinipple and Morris, while offering advantages to navigation in the spring, similar to those met with at the site next to Government wharf Levis, is more difficult of access on account of a stronger current prevailing and a greater quantity of heavy ice floating by at times, opposite the proposed dock entrance, and in rather close proximity thereto, besides being unsuited in other respects for the location of such a structure.

The ice clears out of the St. Charles estuary, usually a couple of days before or after the Lake St. Peter ice passes the City on its way to the sea, at which time navigation is considered to be definitely open. The following table shows the dates of the opening and closing of navigation in the St. Charles, as well as in the St. Lawrence generally, at Quebec, for a number of years back, as recorded by Mr. Simons, who has acted for a long time in the capacity of engineer to the Harbour Commission, and registered at the local office of the Marine and Fisheries Department.

In the year.	The Ice of the St. Charles River broke up on the	The St. Charles froze over on the	The Navigation of the St. Lawrence opened on the	The St. Lawrence Navigation closed on the
1860		December 18.....		
1861	April 16			
1862				
1863	May 1.....	do 10.....		
1864	April 10	November 10		
1865		December 20		
1866	do 20	do 5.....	April 26	November 24.
1867	do 29	November 18		do 26.
1868	do 23	December 3.....	do 24	December 1.
1869	do 24	do 17	do 30	November 30.
1870		November 29.....	do 23	do 22.
1871	do 17		do 17	December 1.
1872	do 22	do 19.....	do 27.....	November 22.
1873	do 27		do 29	do 24.
1874	May 8		May 9.....	November
1875	do 10		April 26.....	do 23.
1876	do 6		May 6	

Mr. Simons remarks that, although in 1873, the St. Charles River was clear from the Gas House upward to Scott's Bridge, on the 27th April, the ice in the mouth or estuary of the river, was prevented from going out by the lower ice bridge over the St. Lawrence, which bridge, I understand, only left on the 5th of May following; I may add that the ice of the St. Charles River proper, above Dorchester Bridge, breaks up every year before the estuary clears itself. This spring the narrow part of this river was broken up a week or more before the mouth showed any signs of giving way; and the same was comparatively clear for a full week before the estuary from St. Peter street to McCallum's property was sufficiently clear from blocks of ice, for permitting free access to the wharves, which could only be approached on or about the 9th of May.

It appears from repeated measurements of the thickness of the ice crust, made at different dates during the winter months, that its breaking up is much more to be attributed to continual washing and wearing away of its under surface by the tidal currents, than to the gradual melting of its upper surface arising from exposure to the rays of the spring sun. Over the channels, the thickness of the ice was found to have been reduced from its maximum of 5 feet to about $1\frac{1}{4}$ feet, or else nearly pierced through whilst in the centre of the estuary and in more exposed positions the diminution was only from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet out of seven during the same lapse of time.

Until about the 15th March, the ice remained hard and sound throughout, and the holes for the soundings were made from 4 to $4\frac{1}{2}$ feet long by about 3 feet wide at top, diminishing to something like 10 or 12 inches square at the underside of the crust. It took one man three hours with a shovel, axe and $2\frac{1}{2}$ inch chisel fitter to a ten foot wooden handle, to pierce through this crust where it had a thickness of 7 feet, exclusive of one foot of snow. After the 15th of March, when the ice was partly rotten and soft, the use of the axe was dispensed with, the holes being reduced to about one foot in diameter, and made solely with the chisel and shovel. One man would then cut such a hole through 5 feet of ice in about two hours. When the sun and the rain water, collected in pools after a thaw, penetrate into the crevices separating the shore or grounded ice from that which remains afloat at different intervals during the ebbing tide, these crevices become gradually stopped up with fresh ice. Rising again with the succeeding flood tide, this newly cemented crust, which is buoyed up unevenly by the water, is subjected to various strains, which cause it to break up into new blocks; these are either shoved out into the stream when open, or towards the land, when the river is frozen over from shore to shore. The extent of this ice shove varies greatly in different parts of the harbour, but when unaffected by wind it goes on at a tolerably uniform rate at the same place.

The ice has been found by the City Engineer to move outward into the open stream at Blais' Booms, above Diamond Harbour, at the average rate of about an inch per day, or nearly 100 feet in one winter season, and about three-quarters of an inch daily towards the north shore, after the ice bridge was taken. In 1871 when the St. Lawrence was frozen over from shore to shore, from below Diamond Harbour upwards, the simultaneous advance of this endless field of ice with the ebb tide, proved disastrous to the shipping which had taken up winter quarters in this neighborhood. In the St. Charles, the ice has been observed to move in various directions, at a rate varying from about 1 inch per day, in the upper part of the estuary to as much as 18 inches in a few hours over the deep water, towards the outer edge of the ice fields.

In the St. Lawrence tideway, taken as a whole, and in all tidal rivers, the stream of ebb is invariably stronger and of longer duration than that of flood. In the Harbour of Quebec this downward current lasts, on an average, nearly eight hours; it continues one hour after low water, and attains a maximum velocity of 4 to 5 knots an hour in mid channel, whilst the stream of flood occupies but four and a half hours, lasting three-quarters of an hour after high water, and flowing at the rate of 3 to 4 knots an hour.

General rules such as the foregoing, laid down in connection with tidal fluctuations, are, however, greatly affected by the winds, and are not always applicable to distinct localities at specified times or in particular sections of the tidal stream, when considered separately.

Every year after the freezing over of the St. Lawrence, from the outlet of the Chaudière River, some $4\frac{1}{2}$ miles above Quebec, westward, the velocity of the tidal currents is sensibly lessened in both directions, owing to the resistance of the ice crust to the free influx of the sea water, into the tidal reservoir beyond the above point.

In the spring the ice first commences to break up at the upper or most south-westerly end of the great navigable artery which flows past Quebec, and in its downward course invariably tends to obstruct the natural water way, which is occasionally contracted to an alarming extent, causing disastrous inundations along the low-lying shores for a considerable distance back on each side; the water in such case frequently rises up to the level of the second stories of the buildings situated in the immediate vicinity of the normal bounds of the river, where it remains sometimes for several days.

The velocity of the current produced by the head of water thus raised above the Sault, is at times sufficiently great to neutralize almost entirely the upward or flood stream, as far down as Point à Pizeau, effectually checking the further ascent of the floating cakes of ice.

When the key bridge near the Chaudière Sault is finally forced out of its place, by high spring tides at the end of April or in the beginning of May, the water thus temporarily dammed back is suddenly let free, the ebbing current is greatly increased in strength and duration along the whole course of the St. Lawrence tideway, whilst the flowing stream diminishes in a corresponding manner. The former current was found on the 5th of last May to continue its downward course for fully nine and three-fourths hours, while the latter kept running up for barely three hours. Some years the spring freshets continue to affect these currents in a similar manner for two or three weeks and more.

The stream of flood is usually stronger, at the same stage of the tide, on the north side of the river, along the immediate city front and the upper part of the south coast of the Island of Orleans—where the banks are concave to the axis of the channel—than on the shore opposite at Levis; it also flows quite briskly up the St. Charles estuary, where it packs “frazis” underneath the solid upper crust for as much as 20 feet in thickness at some places, especially when aided by a steady north-east wind.

On the contrary the stream of ebb is, as a rule, more severely felt, at the same stage of the tide, along the south shore from near the Chaudière River down towards Glenburnie Cove, than on the shore opposite as far as la Canardière flats.

From near Hall's wharf (formerly Henry's wharf), at the upper end of Glenburnie Cove, where the river commences to trend suddenly to the eastward, the tendency of the particles of water in motion to continue moving in straight lines, causes the body of the downward current to traverse to the north towards the Beauport flats, after giving rise to the well known and clearly defined periodical eddy, extending from this point to the St. Lawrence Tow Boat Company's piers. Part of the ebbing stream is drawn into the northern channel of the river, but the bulk of it follows the southern or ship channel close to its north bank on the Island of Orleans, after beating hard against the rocky point at the head of this island, whence it is again deflected towards the south shore at Indian Cove East and Pointe Martinière.

In the St. Charles Estuary the ebbing current is comparatively weak, excepting, perhaps, in the shallow shifting channels—towards the time of low water. In the gap between the breakwater and the Commissioners Wharf, the current flows outward the whole time, excepting during the first hour or thereabouts of ebb, and for about one and three-quarter hours after the tide has been rising some ten minutes; it then moves rather slowly inward. The maximum velocity of this outward current was found to be one and three-quarter miles per hour at the beginning of May, but it

probably exceeds this in August, when the flood tide is much less affected by the fresh water from above; this current is a source of inconvenience to vessels arriving or leaving in the rear of the breakwater, on account of the bold slope of the sand bank which rises close thereto.

The following table shows approximately the mean maximum velocity of the current, at from 100 to 400 feet outside the entrance of the projected graving dock, as located on various sites by Messrs. Kinipple and Morris, according to direct observations made simultaneously at these places by several observers:

Date.	Indian Cove site, east of Gilmour's long wharf, South Shore.*		Government Wharf site, St. Joseph de Levis.†		Diamond Harbour site, Lampon's Cove.‡		Wolfe Cove site, above Roche's Mill.§		Total mean range of the tide, per gauge, at Pointe à Carcy.	Remarks.
	Flood Tide.	Ebb Tide.	Flood Tide.	Ebb Tide.	Flood Tide.	Ebb Tide.	Flood Tide.	Ebb Tide.		
	Miles per hour.		Miles per hour.		Miles per hour.		Miles per hour.				Feet.
1876.										
April 27	2 $\frac{3}{4}$	2 $\frac{1}{2}$	1 $\frac{3}{4}$	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{7}{8}$	1	19.7	High; Spring tide. Calm.
May 5	.....	3	.....	1 $\frac{3}{4}$	.....	1 $\frac{1}{2}$	.....	1 $\frac{5}{16}$	13.0	Fine and calm.
do 6	2 $\frac{1}{2}$	3	1 $\frac{3}{4}$	2 $\frac{1}{10}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1	1 $\frac{5}{16}$	13.4	N.-E. breeze, with rain.

* At the final breaking up of the "Sault" bridge, between 5th and 6th of May, some heavy masses of ice passed at about 300 ft. outside of wharf.

† None of the lake ice passed nearer to wharf than from one-third to one-fourth of a mile.

‡ Very little of the upper ice passed inside of the mooring piers, many heavy blocks over the Fly Bank.

§ No ice floating down near detached mooring piers, which are under cover of Pointe à Pizeau.

In moderately calm weather, the floating ice is about equally distributed on both sides of the axis of the current or the line of greatest velocity, whether the tide move up or down the river, the number of cakes and the quantity of "floes" decreasing as we recede from this line laterally. When however, strong winds prevail, the ice is often packed close to the lee shore in spite of the rapid currents.

According to local information, the winds most frequently experienced at Quebec during the winter season come chiefly from the west and north-west; last winter however, I found them to be north-easterly; this is admitted by the citizens of Quebec to be of unusual occurrence.

R. STECKEL,

*Assistant Engineer,
Public Works Department.*

APPENDIX No. 8.

MEMORANDUM

Respecting the Lake St. John and Saguenay Regions, the Public Works Executed, in Progress or Projected at the Various Localities Therein, together with Notes on the Route to Hudson's Bay and the Navigation Thereon, etc., etc.

BY

G. F. BAILLAIRGE,

Deputy of the Minister of Public Works.

DEPARTMENT OF PUBLIC WORKS,

OTTAWA, 1st February, 1883.

SIR,--I have the honour to submit herewith the following memorandum respecting the Lake St. John and Saguenay regions, in connection with the works executed and in progress under the Dominion Government, or which have been applied for, since 1867.

The geographical and geological features, the climate, agricultural resources and population of these regions, and especially of the Lake St. John region which is destined to become one of the most important of the Province of Quebec, have been briefly described according to the various surveys and explorations made up to the present time.

Trusting that the whole may be found useful for future reference,

I have the honour to be, Sir,

Your obedient servant,

G. F. BAILLAIRGÉ,

Deputy of Minister Public Works.

The Honourable

SIR HECTOR L. Langevin, K.C.M.G., C.B.,

Minister of Public Works.

APPENDIX No. 8.

PART I.

LAKE ST. JOHN

— AND —

TRIBUTARIES, ETC

Part I.

LAKE ST. JOHN AND RIVER SAGUENAY REGIONS.

The River Saguenay region appears to have been first explored by Roberval, Lieutenant-General of the King of France, in the Counties of Canada, Saguenay and Hochelaga.

Bouchette, in his Topographical Dictionary of the Province of Lower Canada, published in London (G. B.) in 1832, says:—

“The expedition consisted of eight ‘barques’ and seventy men, under his command; they sailed from Quebec, 7th June, 1543. All that is known of this voyage is, that eight men and one ‘barque’ were lost.”

Lake St. John named Piekouagami, per Charlevoix, by the Montagnais Indians, was discovered on the 20th of May, 1641, by the Jesuit Missionary, Jean de Quen, after visiting the establishments of the Jesuit Fathers at Three Rivers, Tadoussac and Chicoutimi.

The territory, whereon the lake is situated, was leased for trading hunting and fishing purposes on the 19th of October, 1658, by the King of France, to Sieur Demaure. This lease was called la Traite de Tadoussac and the territory to which it applied was called the King's Domain. This Domain extended from Ile aux Coudres to a point two leagues below Sept Iles and embraced the posts of Tadoussac, Chicoutimi, Lake St. John, Nékoubau, Mistassini, Papinachois, Naskapis, River Moisy, Sept Iles and other places connected therewith, including the Seigniorship of Malbaie. See Notes D 1, D 2.

The Rev. Jesuit Father Charles Albanel, one of the Tadoussac missionaries, is the first European who is known to have accomplished the journey up the Rivers Saguenay and Chicoutimi, Lake Kinogami, Lake St. John and the River Mistassini to the Great Lake Mistassini, and thence down the discharge of this lake through the River Rupert to James' Bay at the south eastern extremity of Hudson's Bay. The journey was made in 1672.

François de Crépieul, the missionary, who resided at Tadoussac from 17th May 1671, to 1702, attended to various missions which then existed along the same route at Chicoutimi, St. Charles, on Lake St. John, St. Ignace, on the River Nékoubau westward from the lake, and at Ste. Famille, on the Great Mistassini Lake.

From 27th of May to 28th of July, 1732, Laurent Normandin made a general examination of the country from Chicoutimi to the upper end of Lake St. John including portion of the Métabetchouan and the Chomouchouan Tributaries. See extracts from his journal in Note E, Part III.

During the months of August and September, 1792, André Michaux, senior, the celebrated French Botanist, (who published a work on the Oaks of North America at Paris in 1801, father of François André Michaux, who published a subsequent work on the forest trees of North America at Paris in 1813) travelled over the same route as the Rev. Charles Albanel, from Tadoussac to within a short distance from the outlet of the River Rupert, on Hudson's Bay. He left Tadoussac towards the end of July with two bark canoes, reached Chicoutimi about the beginning of August, Lake St. John towards the 7th of August and the Great Lake Mistassini on the 4th of September, voyaged down the River Rupert during two days when he was compelled by intense cold and snow to retrace his steps to Tadoussac where he returned on the 1st of October, 1792, having accomplished the journey to Hudson's Bay in five weeks and the return journey to Tadoussac in three weeks, as will be further more fully described. See remarks respecting journey in Note F. 1, Part III. See Notes A, B, C, respecting Hudson's Bay and Arctic region, Part III.

Prior to June, 1827, Adolphe LaRue, P.L.S., made a survey of Lake St. John, etc., as shown by a map compiled by William Sax, dated June, 1827.

No record, however, of LaRue's survey can be found in the Department of Crown Lands at Quebec. See Note R, Part III.

GOVERNMENT EXPLORATION OF 1828.

The following information, in connection with this exploration, is based on Mr. Arthur Buie's narrative in his interesting work, "*Le Saguenay et la Vallée du Lac St. Jean*," published at Quebec in 1880.

A short time after 1820, Mr. Paschal Taché, who had traded for the Hudson's Bay Company during the twenty-two preceding years in the Lake St. John and Saguenay regions, furnished the Legislative Assembly of Lower Canada, with a description of it, especially from the Baie des Ha! Ha! up to the outlet of the River Mistassini, at the upper end of Lake St. John. (See memorandum by Paschal Taché at Note F. 2., Part III.)

He stated that the land from Chicoutimi, on the north-west side of the River Saguenay and Lake St. John, up to the River Mistassini, for a mean breadth of twelve miles and a distance of about 100 miles, would be found very fertile when cultivated; that the land was excellent for a breadth varying from fifteen to eighteen miles and a distance of sixty miles, between Baie des Ha! Ha! and Lake St. John, northward from Lake Kinogami; that the climate was temperate; that the forests consisted generally of pine, cedar, poplar, spruce, and aspen (*trembles*); also that the cabbages and potatoes grown at Chicoutimi were much larger than those grown at Quebec.

The Legislative Assembly, acting upon the suggestion of Andrew Stuart, one of its prominent members, and with the sanction of Lord Dalhousie, the Governor-General, subsequently ordered an exploration of the region in question, to be made.

This order was carried out in 1828 by three parties, which were organized for the purpose, viz:—

1st. Joseph Bouchette, Deputy Surveyor-General, W. Davies, and Lieutenant Gouldie, of the 66th Regiment. They went from Three Rivers up the St. Maurice for a distance of about 100 miles towards La Tuque, thence up one of its tributaries, the River Bastonnais, to the source of the River Ouïatchouan, and down the latter to Lake St. John; they afterwards explored the River Chomouchouan, went round Lake St. John, thence up the Belle Rivière, and Rivière des Aulnets, thence across Lake Vert, Lake Kinogamichiche and the portage across to Lake Kinogami, and down this lake and the River Chicoutimi to its junction with the River Saguenay, where the town of Chicoutimi is now situated. They had thus accomplished a journey of about 800 miles of canoe navigation.

2nd.—Joseph Hamel, P. L. S., Lieutenant Baddeley of the Royal Engineers, a geologist, and Mr. Rowan, who proceeded to Lake St. John by the River St. Lawrence and the River Saguenay.

3rd.—Mr. Proulx, P. L. S., and Mr. Nixon, of the 66th Regiment, who followed the same route as the latter, although the original intention was that one of the parties should take the route of the River Ottawa and one of its tributaries connecting with one of the Lake St. John tributaries.

Each party was provided with a canoe and crew of four to five men, besides the Indian paddlers and guide.

After the exploration was completed, each party furnished the Legislative Assembly with a Report on the country they had examined. Those Reports describe the geological, agricultural, and geographical features of the regions traversed.

SUBSEQUENT EXPLORATIONS.

In 1847-48, A. F. W. Blaiklock, P. L. S., assisted by George Duberger, P. L. S., made an exploratory survey of the country between Quebec and Lake St. John, on a straight line from the S. W. corner of the Township of Stoneham to a point one

mile west of the Hudson's Bay Company's post, near the mouth of the *Métabetchouan*. This line measured 104 miles 20.74 chains on a course N. 15° W. astronomical. The exploration was commenced on 16th of September, 1847. According to his Report, which is dated 9th April, 1849, the country along the line was not favourable for settlement, and presented many obstacles to the construction of a serviceable road.

Mr. James Richardson, one of the assistants of Sir William Logan, as shown by his Report, dated 31st December, 1857, made an exploration of the River Saguenay, Lake St. John, and a portion of its tributaries. He commenced at Tadoussac on 23rd September, 1857. In his Report he gives the geographical and geological descriptions of the country, together with a list of economic materials of the region he examined. See Note G. 1, Part III.

Mr. Robert Bell, who accompanied Mr. J. Richardson in 1857, made a Report on 1st March, 1858, on the specimens of recent shells he collected, and on the climate, soil, and timber of the country around Lake St. John. See Note G. 2, Part III.

Mr. James Richardson afterwards explored the country for a distance of 290 miles from Lake St. John up the River Chomouchouan, White Fish Lake, and Lake Wakinitche, at the first and second heights of land, and thence down to the Great Lake Mistassini in June, July, August and September, 1870. In his Report, dated 20th April, 1871, he describes the climate, soil, forests, geological features, and economic materials of the region explored.

Mr. Walter McQuat, in July, August and September, 1871, made an examination of the valley of the river Mistassini, up to and across the height of land to the Great Lake Mistassini, a distance of 148½ miles, measured on straight lines, and also of the coast of the lake for 150 miles. In his Report, dated 9th May, 1872, he describes the soil, forests and geological features of the region explored.

In a Report dated 9th March, 1881, A. L. Light, Engineer-in-Chief of the Province of Quebec, states that the country between Quebec and Lake St. John has been surveyed instrumentally through the *Métabetchouan* and *Batiscan* Valleys, the former in 1873 and the latter in 1879, with the view of establishing the most favourable route for a railway. A good line was found running south of Lake St. Joseph from the crossing of the River Jacques Cartier direct to St. Raymond, and with practicable grades through to Lake St. John, a total distance of 179 miles from its junction with the North Shore Railway between Quebec and Montreal. The junction is at four miles to the westward of Quebec.

The first division of the railway between Quebec and St. Raymond, distance 31 miles from the junction, has been under construction since 1879, and in operation during the past year, 1882. The next division is in progress of construction under a chartered Company aided by the Federal and Provincial Governments and by the Municipal Council of Quebec.

The corporation of the City of Quebec, under a By-Law passed 9th February 1883, in accordance with the Act 38, vic., chapter 46, contribute \$350,000 towards the construction of this Railway, this sum to be paid at the rate of \$2500 per mile, after the completion of each section of ten miles of the said Railway.

The Federal Government during the session of 1881—1882, granted \$3200.00 per mile (not to exceed in the whole \$384,000.00) towards its construction, as per the Act 45, vic. chapter 14.—(1882.)

LAKE ST. JOHN.

Lake St. John, the Indian name of which is *Piekouagami*, according to Charlevoix, as before stated, or "*Piackouakami*," according to Normandin, signifying "Shallow Lake," is situated between 48° 25' 37" which is the latitude observed by Capt. E. Deville, P. L. S., in May, 1877, at the mouth of the River *Metabetchouan*, on the south side of the lake, and 48° 44' 75" at the mouth of the *Peribonca*, on the more northerly part of the lake, as measured on the most recent map published by the

Crown Lands Department of Quebec, in 1880. It extends from the $71^{\circ} 46'$ to $72^{\circ} 20' 75''$ of west longitude, as measured on the same map. See Notes E. R. Part III.

The first map of this Lake and of the Saguenay, appears to be the one which was published with the *Histoire de la Nouvelle France*, by Charlevoix; although it was prepared at a very remote period, its general correctness is remarkable.

Various maps, including those of LaRue, Sax, Bouchette, and Taché, have since been made or published, but none of them show that the Lake has ever been sounded in order to ascertain whether it can be safely navigated by steamboats or sailing vessels, and to determine the points most accessible for landing passengers and freight. The settlement of the entire country around the Lake, and especially on its north side, would be rapidly developed with the aid of proper water communication across the Lake, the completion of a good road around it, and its connection with Quebec by means of a railway.

The Lake is about 100 statute miles on an air line from Quebec; $41\frac{1}{2}$ statute miles, by the shortest road, from Chicoutimi, and 110.97 statute miles from Tadoussac, viâ. the Petite Décharge and the River Saguenay.

Greatest length, from Belle-Rivière, near foot of lake and at its south-east end, up to outlet of river Mistassini at the north-west end. or towards head of lake.....	27 $\frac{3}{4}$ statute miles.
Greatest width across the lake from outlet of the river Péribonca to the outlet of the river Ouïatchouan, or from north to south along the Meridian	20 statute miles.
Width on Meridian across centre of lake	17 $\frac{1}{2}$ statute miles.
Contour of lake, per map of 1880, by Commissioner of Crown Lands, Quebec	85 statute miles.
Area of lake, per E. E. Taché, Deputy Commissioner of Crown Lands, Quebec.....	365,40 miles.
Elevation of lake above the sea, according to report of A. L. Light, Chief Engineer, Government Railways, Quebec, dated 8th March, 1881.....	278 feet.
Elevation of lake above the sea, per map of 1880	300 feet.
Elevation of lake above the sea, per Richardson, at mouth of Ashuapmouchouan, in June, 1870	293 feet.
Depth of lake is said to vary generally from 3 feet at one mile from shore, to 12 and 54 feet at $1\frac{1}{2}$ to 3 miles from shore, and to 60 feet towards the middle of the lake	3 to 60 feet.
See Note S., Part III.	

Bouchette, in his Topographical Dictionary, represents the depth of the lake as being 240 feet at centre.

In spring the waters of the lake rise from 15 to 34 feet above its winter level, in the course of fifteen days.

In autumn they rise 3 to 4 feet, suddenly, during high winds, but only for periods of short duration.

The spring floods retard the cultivation of considerable tracts of land around the lake and have been the subject of great complaint.

In a letter, No. 10,666, of 29th December, 1880, from his Lordship D. Racine, Bishop of Chicoutimi, to Sir Hector L. Langevin, Minister of Public Works, it is stated that the outflow from the lake is much diminished by the Government slide and dams, at the head of the Petite Décharge, wherefore he requests the Government to improve the other outlet called the Grande Décharge.

This request was assented to and the improvement is being proceeded with, as will be shortly explained.

Winds.

The north-westerly and south-westerly winds are those to which the lake is most exposed.

Ice.

Ice begins to form in November, and the lake is afterwards frozen over so that it can be travelled upon with safety, with heavy loads, after the 10th of December.

Ice begins to disappear along the borders of the lake towards the middle of April.

The whole of the lake is free from ice towards the 12th of May.

Bed of Lake.

The Bed of the lake, according to Sir William Logan and M. Richardson, one of his assistants, consists of limestone which crops out on the western shore.

A full description of the geological features of the Lake St. John region will be found in the Report of the Geological Survey of Canada, from its commencement to 1863, the year of its publication. See extracts in Note H, Part III.

CLIMATE—LAKE ST. JOHN.

According to Bouchette, Richardson, Sullivan, etc.

The lake is surrounded by mountains, which approach the south side, but are from 30 to 40 miles distant, and more, from its north and west sides; those on the north side are lower than those on the north-east side. See map compiled, from Adolphe LaRue, P.L.S., original map and other sources, by William Sax, P.L.S., dated Quebec, June, 1827. Copy in Department of Public Works, Ottawa. See Notes, G. 1, G. 2, H. Part III.

It is, therefore, sheltered against the north-east winds, which are the worst on the St. Lawrence, because they follow the sea from the Polar regions and are constantly saturated with moisture and cold; they lose much of their intensity as they advance further inland, where they become lighter, drier and less damaging.

As the lake is sheltered by mountains, the climate is comparatively mild, less subject to variation and more regular than in the rest of the Province, as established by meteorological observations.

Heat and rain are not so excessive as in the greater part of the district of Quebec.

The climate, says Bouchette, is as mild as that of Montreal, and is highly favourable for the culture of all sorts of grain and vegetables, including fall wheat, beets and turnips, and is specially adapted for the raising of horned cattle, sheep and pigs.

Spring begins some two or three weeks earlier than at Quebec, and frost injurious to vegetables, from two to three weeks later than Chicoutimi. In the spring the soil is ready for the cultivation of vegetables before the lake ice disappears.

James Richardson, in his report of 31st December, 1857, states that the unexplained superiority of the climate in the Valley of Lake St. John over places more to the south renders the examination of this part of the Province a subject of considerable importance. See extract from his report in Note G. I.

Mr. John Sullivan, the surveyor, states that, in 1873, the barley and wheat of the Lake St. John region were the finest he had ever seen, and that the leaves of the potatoe plants were still green during the last fortnight of October.

SOIL—LAKE ST. JOHN.

The best lands, which consist of alluvial soil of great depth and fertility, are to be found chiefly on the western, northern and north-eastern sides of the lake.

The soil on the south shore, which is generally settled, is not so fertile nor so deep as upon the north and west shores.

The entire shore upon the north and east sides of the lake from the river Peribonca to Belle Rivière, distance of twenty-seven miles, is bordered by a wide belt of

light coloured sand, which becomes more compact and harder as it approaches the belt of rocks which form the real shore.

This belt of sand is from 400 to 500 feet in width. It presents a smooth surface, except at a few intervals where points of rock or tufts of willows are found extending into the lake, and it is so firm that the foot-prints of travellers upon it are scarcely visible. See Notes G. 1, G. 2, H., Part III.

FORESTS—LAKE ST JOHN.

In the rear, northward from the River Peribonca and down to the Grande Décharge, distance of about eighteen and three-quarter miles, there is an extensive forest of white birch, spruce, fir, aspen (*trembles*), and small red pine called "cyprés" in the locality, and other species, with various kinds of shrubs bearing fruit upon which the bears, which are numerous in this region, come frequently to feed. See notes E, F 1, F 2, G 1, G 2, and H, Part III.

From the lake to the first range of mountains the land is generally level, well timbered, and very fertile, and is from forty-eight to fifty-eight miles in breadth, according to the map prepared by William Sax, as previously stated, in June 1827. It is the finest part of the territory bordering along the lake. This is also the only region from which the firm of Price & Co. now procure their pine logs, since the time of the disastrous fires which occurred in April and May, 1870, and destroyed the timber and the whole of the villages of "Notre Dame du lac, de la Pointe Bleue," "St. Louis de Chambord or Pointe aux Trembles," and "St. Jérôme," on the south-west and south sides of the lake, together with the villages of Hébertville, Grand Brulé, and a portion of the villages of Chicoutimi and St. Alphonse on the Baie des Ha! Ha! where the pier was also burnt.

FOREST TREES (ACCORDING TO MICHAUX).

André Michaux, the French Botanist before referred to, explored portions of the shores of the lake during his voyage by this route to the Great Lake Mistassini and Hudson's Bay. See note F 1, Part III.

(See pamphlet published by the late Rev. Ovide Brunet, professor of Botany at the Laval University of Quebec, published in 1861).

Amongst the manuscript notes he left to his son, Frs. A. Michaux, we find the following information on the subject:—

The forests around Lake St. John are composed of various species of precious timber, such as pine, tamarack, spruce, cedar, etc.

This is the most northerly region he says, where red pine (*pinus rubra*), white spruce (*abies alba*), and cedar (*thuya occidentalis*), have been observed.

White pine (*pinus stroba*), is found in a vast extent of the country, but not everywhere in equal abundance.

The first pines of this species are found on the banks of the river Mistassini, some 20 miles above its junction with Lake St. John; two degrees further south it becomes more abundant.

The *melèze* (*larix americana*), otherwise called tamarack or hacmatack (*épinette rouge*) in Canada, is very abundant on the lands around the lake; it is found in groves of several superficial miles in extent.

Hemlock (*abies canadensis*) "pruche" begins to grow near Hudson's Bay; but at Lake St. John, it fills the forest.

To these species, Brunet says, we may add another which is remarkable for its size; it is the *populus balsamifera*, commonly known as "liard" in French, or poplar. It is found in great abundance around the lake and throughout the entire country traversed by the river Saguenay between the 47° and 49° of latitude.

It attains a height of 80 feet and a diameter of 3 feet in these regions where Michaux represents the temperature as being very severe in winter and the soil very damp.

For further details respecting soil, timber and economic materials, see extracts from Geological Reports of J. Richardson, 31st December, 1857, and Robert Bell, 1st March, 1858, in Notes G 1, G 2, H, part III.

WILD ANIMALS.—LAKE ST. JOHN.

In the region northward of Lake St. John, the wild animals generally found are the bear, deer, caribou, karcajou, beaver, otter, martin and mink.

FISH.—LAKE ST. JOHN.

According to the pamphlet published by the Department of Agriculture in 1879, at Ottawa, respecting the Saguenay and Lake St John, the lake abounds with several species of fish.

They are the doré, carp, trout, white-fish, brochet, and a fish named the "awenash," a sort of salmon of medium size which is said to be the most delicious fresh water fish that can be eaten.

There is also the "munie," a strange looking fish with a body the shape of a sea-toad (*crapaud de mer*), a head like that of a cod-fish, but much flatter, and a tail similar to that of an eel and of the same colour. Its ordinary length is about 2½ to 5 feet. The Indians are fond of it, but others only eat the liver which is very delicate in taste.

The greatest quantity of fish was formerly taken at the mouth of the *Ouatchouan* where it was so abundant that it was prepared for exportation to other parts of Canada. The same may be said of the trout, brochet, doré and scarp of the *Belle-Rivière* and *Lake Kinogami*.

SETTLEMENTS AROUND LAKE ST. JOHN.

The section of country from the mouth of the Mistassini to that of the Peribonca and thence to the Petite Décharge on the northern and north-eastern shores of the lake has not been settled as yet, owing to the want of roads.

The south-eastern, southern and western sides of the lake are generally settled from the Island of Alma, up to the River Mistassini, and for some distance up the latter upon its western side.

The principal villages around this portion of the lake, and their population according to the Census taken in 1881, may be enumerated as follows, viz :—

	Sou
1st. St. Joseph, on the Island of Alma, between the Grande Décharge and Petite Décharge, the two outlets at the foot of the lake on its eastern side. Population in 1881.....	7
2nd. St. Gédéon de Grand Mont, about four miles south of the Petite Décharge, and on the east side of lake. Population in 1881.....	6
3rd. St. Jérôme, on south-east side of lake, nearly midway between Belle Rivière and the River Metabetchouan, or at eight miles south-westward of St. Gédéon. Population in 1881.....	1,8
4th. Pointe aux Trembles or St. Louis de Chambord, on south side of lake, eleven miles to the westward of St. Jérôme, and five miles westward of the Metabetchouan. Population in 1881.....	1,0
5th. Notre Dame du Lac St. Jean, or Roberval, on the south-west side of the lake, is 21½ miles north-west from St. Jérôme. Indian Chapel and Reserve at Pointe Bleue, are 4½ miles further north on the same side, and at twenty-six miles from St. Jérôme. The Indian Mission Church at Pointe Bleue is at 43° 35' 29.3" of north latitude, and 72° 18' 35" of west longitude, according to observations made towards 1878. Population, comprising 300 Indians belonging to the Reserve	1, 6

- 6th. St. Prime, on the south side of the Rivière aux Iroquois, at about one mile below the outlet of the River Chomouchouan, or Ashuapmouchouan, on the south-west side of the lake, and about eight miles to the north-westward of Notre Dame du Lac. Population in 1881... 936
- 7th. St. Félicien, on the south side of the River Chomouchouan, at about $7\frac{1}{2}$ miles to the south-westward of St. Prime, and seven miles above the outlet of the river, on the west side of the lake. Population in 1881 530
- 8th. In addition to the above named villages, the settlements of the townships of Parent, Normandin and Albanel, between the Rivers Chomouchouan and Mistassini, on the north-west side of the lake, which are now being settled, contained 322 settlers in 1881.

See Notes K, L, M, N, Part III.

The total number of Montagnais Indians in the Lake St. John region is estimated at about 3,000; their number is decreasing from year to year.

Buies, in his work before referred to, gives many interesting details as regards the colonization and progress, the churches, schools, and agricultural products, etc. of the various settlements in the Lake St. John and River Saguenay regions, up to 1880.

TRIBUTARIES OF LAKE ST. JOHN.

Eight rivers of considerable length interrupted by rapids, cascades and falls, at various points, furnish an abundant and continuous supply of water to the lake.

They may be briefly described as follows, viz:—

From the South-east.

1. The Belle Rivière or Kushpagan, Indian name for River leading to the Lake, is about forty-five miles in length and flows from the south-west. It is seven and a-half miles from the mouth of the Petite Décharge, and four miles south from St. Gédéon, and is situated upon the east side of the lake.

At seven miles south-east from its outlet it connects, with Rivière des Aulnaies, which flows from the eastward and leads up to Lake Kinogamichiche and the portage Ouaihoua across the high land which separates its source from Lake Kinogami.

These streams and the last named lake, together with the River Chicoutimi which discharges into it, and afterwards out of it at the lower end, are upon the canoe route which has generally been followed between the Rivers Saguenay and Lake St. John since they were first discovered.

See Notes E, and F 2, Part III.

From the South.

2. The Metabetchouan, Indian name for "Where we descend by means of portages," is ten and a-half miles south-westward from Belle Rivière, or six miles west from St. Jérôme.

The latitude of the west point of its outlet on the south side of Lake St. John is $48^{\circ} 25' 37''$ as established by E. Deville, P.L.S., in May, 1877. (See Report of Crown Lands, Quebec, for 1877.) This outlet is the most southerly point of the lake.

From its source at Lake Patitachekao, per Normandin, or Lac aux Rogons to Lake St. John, a distance of about eighty miles, there are numerous cascades and rapids, and at one point are falls 200 feet in height.

The Jesuits, who had charge of the Montagnais Mission of Tadoussac from 1640 to 1782 inclusive, had also charge of the missions then existing along the north shore of the St. Lawrence from Sept Îles up to Malbaie, and of those of the Saguenay and Lake St. John regions as far as the Great Lake Mistassini, (Grand Lac des Mistassins) and occasionally as far as Hudson's Bay.

One of their missionary establishments was at the mouth of the Metabetchouan, upon its eastern side, where they had a chapel and no less than 300 acres of land under

cultivation, comprising orchards of plum and apple trees, and gardens where all sorts of vegetables, including cucumbers and melons, were successfully cultivated, together with currants, etc. Traces of these were seen by Mr. Nixon during the exploration of 1828; some of the apple and plum trees and a portion of the plough furrows were still visible at that time.

It afterwards became a trading post of the Hudson's Bay Company, who erected their buildings on the site formerly occupied by the Jesuits.

The firm of Price & Co. have a steamer here for the towage of timber from various points of the lake to the Petite Décharge, the minor of the two outlets at the east end or foot of the lake. From this point the square timber and saw logs are floated down along booms and through a slide of 5,026 feet in length, and thence through the River Saguanay to the saw mills at Chicoutimi and the Baie des Ha! Ha! whence most of the sawn lumber is shipped in ocean vessels to Europe.

The head waters of the Metabetchouan are near those of the Grande and Petite Rivières Bastonnais, two of the north-eastern tributaries of the River St. Maurice; the outlet of the Grande Rivière Bastonnais is two miles above the falls of La Tuque which are three and a-half miles above the mouth of the Petite Rivière des Bastonnais, and about 100 miles above the mouth of the St. Maurice at Three Rivers.

The favorite canoe route between Lake St. John and the St. Maurice appears to have been hitherto through the Metabetchouan and Petite Rivière Bastonnais.

There is also a route from the head waters of the Metabetchouan to those of the river Batiscan and thence through the latter down to the St. Lawrence.

Another route is that of the Ouiatchouan, which was followed by Bouchette.

3. Ouiatchouan, or the Ouiatchitchiouan, as shown on the map in Charlevoix *Historie de la Nouvelle France* published at Paris in 1744, signified in the Indian language Crooked River, or do you see the falls there. It is upon the south side of the Lake.

Its outlet is nine miles on a direct line west from the mouth of the Metabetchouan; the distance by the road is nine and a-half miles. Its source is seven miles from lake Quaquamaque, per Bouchette, and the river is about fifty-nine and a-half miles in length, in which distance there is a perpendicular fall of 236 feet at one mile from the outlet on Lake St. John. The total fall on the first fifteen miles, from Lake Ouiatchouan to Lake St. John, is estimated at 290 feet.

Along its course in a southerly direction from Lake St. John to the height of land, there are several Lakes, viz:—

	Long		Wide	
The Ouiatchouan	13 $\frac{3}{4}$	x	$\frac{1}{2}$	miles
" Bouchette.....	3 $\frac{1}{4}$	x	1	"
" Commissioners.....	13	x	$\frac{1}{2}$ to 1	"
" Quaquakamaksis.....	4	x	$\frac{1}{2}$	"
" Ecarté	4 $\frac{1}{2}$	x	$\frac{1}{4}$ to 1	"
" Najaoulank.....	7	x	$\frac{1}{3}$ to 1	"

This stream was examined by Bouchette, Deputy Surveyor General, in 1828 during his exploring tour in company with W. Davies and Lieutenant Gouldie. They proceeded from Three Rivers up the St. Maurice towards La Tuque, thence up the River Bastonnais to the source of the Ouiatchouan, and down the latter to Lake St. John.

The principal forest trees they observed along the Ouiatchouan were ash, birch, elm, spruce, fir and, some white pine.

The latitude of the outlet of this river at its west point, is 48° 27' 5.1", as determined by Captain E. Deville, in May, 1877.

See Notes E, F 2, and H, Part III.

From the North-West.

4. The Chomouchouan, or the Ashuapmouchouan, which, in the language of the Montagnais hunters, means "Where we watch the deer."

This river, which may be considered as a continuation of the Saguevey, is three-quarters of a mile wide at its outlet, and about 400 feet wide at 100 miles up stream.

Its outlet is one and a-half miles, north-west, by the road, from St. Prime, at the south-west end of the lake, or five miles north-west, from Pointe Bleue, which is four and one-half miles north from Notre Dame du Lac, as measured along the lake shore. The distance from the mouth of the Ouiatchouan, *viâ* Notre Dame du Lac and St. Prime, by the road, is fifteen and one-half miles, and nearly the same by the lake shore.

It was first explored for the French Government as far as Lake Nékoubau, about 189 miles north-west from Lake St. John, in 1732, by J. L. Normandin, a French surveyor. He made a map of the river and country he then explored with a report thereon, which are on record in the Archives of the Marine Française. A copy of these was made there by P. L. Morin, P. L. S., and is now on record in the Crown Lands Department of Quebec, and in the Department of Public Works at Ottawa. (See Note E, Part III.) The map indicates the establishment of Peltier, near Lake Nékoubau, where it still existed in 1860. Some miles below it, on Lake Chomouchouan, as named by Charlevoix, who also called it Lac de St. Pierre, there was one of the King's trading posts, which was established in 1690, and comprised a house of 12 x 12 feet and one superficial arpent of cleared land.

The Chomouchouan was examined by Bouchette for a distance of thirty miles from its outlet up to Portage à l'Ours, in 1828.

It has numerous rapids and falls, and in its course, which is nearly north-west, it traverses forests of fir, white birch, poplar and cypress.

Lake Chomouchouan, he says, is about 150 miles west of Lake St. John. It is the last of the King's posts in the Saguenay region, and is inhabited by about fifteen families.

Mr. A. F. W. Blaiklock, P.L.S., surveyed the River Ashuapmouchouan from its mouth up towards the lake in 1860, and furnished a report of the survey to the Department of Crown Lands at Quebec.

Mr. James Richardson made a survey and examination of the unexplored portion of the country along the River Ashuapmouchouan up to the height of land at White Fish Lake, and thence to the Great Lake Mistassina, for the purpose of ascertaining the geological structure of that region, and its fitness for agricultural purposes, as instructed by Alfred R. C. Selwyn, Esq., F.C.S., Director of the Geological Survey of Canada.

He left Pointe Bleue on the west side of Lake St. John on the 23rd June, 1870, and ascended the River Ashuapmouchouan (Chomouchouan).

He commenced operations twenty-four miles from Lake Ashuapmouchouan, the remainder from Lake St. John having been previously surveyed topographically by Mr. Blaiklock, P.L.S., whose plan he used for his geological examination of this portion of the river.

The River Ashuapmouchouan, a little above the ninety second mile, is divided into two branches. The branch from the north-north-east, which is the largest, is called the Chief River by the Indians. The other, which Richardson ascended, and which is the smaller branch, is called the Ashuapmouchouan.

He ascended the Nékoubau River, which is the minor branch of the Ashuapmouchouan, to the highest lake on the height of land, called White Fish Lake, 170 miles from Lake St. John.

Whitefish Lake is close to the water-shed, which is on the boundary line between the Province of Quebec and the territory to the north.

From Lake Ashuapmouchouan, which is 1,184 feet above the sea, to the height of land which divides the waters of the Saguenay from those flowing to Hudson's Bay, the upward course is generally north-westerly.

From Whitefish Lake, continuing in a north-westerly course, he descended to Lake Abatagomaw, 184 miles from Lake St. John, and to Lake Chibogomou, 200 miles from Lake St. John.

Lake Abatagomaw, Lake Chibogomou, and another into which the latter empties, itself by two outlets, are supposed to form the head-waters of the Notaway, which is said to be a large river where it empties into James' Bay.

Lake Abatagomaw, which is crowded with low rocky islands, is about five miles beyond the first height of land, and at 1,206 feet above the sea. It is supposed to measure twelve miles from north-east to south-west, and nine from south-east to north-west.

Lake Chibogomou is 1,247 feet above the sea, and measures about twenty-five miles in length on its south-east side, and from six to seven miles in width. It is studded with numerous low and elongated islands.

From Lake Chibogomou he crossed another height of land in the last portage, and reached Lake Wakinitche in the same direction as his former course, and at a distance of four miles further. The highest point in the last portage is 1,485 feet above the sea, and forty-five feet above Lake Wakinitche, which is 1,440 feet above the sea.

From Lake Wakinitche, which stretches north-easterly about twenty-four miles, and is from a half to three miles wide, he followed the stream by which it empties, at a distance of about four miles, into Abatagoush Bay on the Great Lake Mistassini, which is 1,381 feet above the sea, and 290 miles by the route followed from Lake St. John. The elevation of Lake St. John above the sea, as observed by Richardson, at the mouth of the Ashuapmouchan Bay, towards the end of June, 1870, is 293 feet.

He afterwards surveyed thirteen miles to the Post of the Hudson's Bay Company, and seventeen miles beyond it on Abatagoush Bay, towards the 13th of August, 1870.

Mr. Burgess, in charge of the Hudson's Bay Company's Post, on the Great Lake Mistassini, informed him that this lake was nearly as long as Lake Ontario, and that its length was estimated at 150 miles.

Mr. Richardson's operations along the coast line of this lake were continued in August and September, 1871, by Mr. McOuat, for a distance of 150 miles, after his examination of the route up the River Mistassini, and across the chief river or main branch of the Ashuapmouchouan, up to the height of land, and thence down to the Great Lake Mistassini, as will be further explained.

Soil.

The land in the valley of the Ashuapmouchouan for the first thirty-six miles up the river, differs little from that around Lake St. John. It is underlaid with clay, which forms an excellent soil. Further up-stream, sand hills predominate, which render the land less favourable for cultivation, but the sandy ground is small in proportion to the good soil.

From the Forks, at ninety-two miles from Lake St. John, to within six or seven miles of Lake Ashuapmouchouan, the country is generally level; the soil is sandy and covered with boulders and rocky ridges of gneiss, for about three miles on either side of the river.

The remainder of the land towards the lake is chiefly sandy loam, good for cultivation.

At the post of the Hudson's Bay Company near the lake, Richardson states that :—

Blueberries ripen, 5th to 6th July.

Raspberries ripen, 7th to 8th July.

Timothy, two feet high, 9th July.

Coarse grass, four feet high, 9th July.

The same soil prevails up the Nékoubau River to Pole Rapids, for a distance of seven miles, after which the land is sandy and covered with gneiss boulders up to Lake Nékoubau, and beyond it, as far as observed.

Along the Great Lake Mistassini, the land is level and consists of a fertile calcareous soil, favourable for agriculture; it is underlaid with flat limestone and does not rise more than 30 feet above the level of the lake.

Forests.

From Lake St. John up to the Forks, the forest was destroyed by fire during the summer of 1869. The trees appear to have been chiefly spruce, balsam-fir, white birch, poplar, mountain-ash, and a shrub like white cedar.

From the Forks to within six or seven miles of Lake Ashuapmouchouan, the trees are spruce and tamarack of a good size, white balsam, fir and white birch, which are rarer and smaller.

Up to and around Lake Nékoubau, the woods are spruce, balsam, fir, tamarack, poplar and mountain-ash, which attain a good size near the lake.

From Lake Nékoubau up to the Height of Land, a distance of fifteen miles on a straight line, or of twenty-four miles by the river and lake, the trees are generally green and of good size, at a few places.

Patrick's Mountain, to the west of Narrow Ridge Lake, is covered principally with white birch trees, 5 to 8 inches in diameter.

[Geological Features.

The rocks observed by Richardson, are classed by him under three heads, viz:—

1. Laurentian gneiss, with crystalline limestones.
2. Crystalline schists consisting of chloritic and opedotic rocks with dolomites, serpentines and conglomerates.
3. The nearly horizontal fossiliferous limestones of Lake Mistassini.

Economic Minerals.

Copper pyrites, iron ore and ochre, were found in the neighbourhood of Paint Mountain and Lake Abatagomaw.

Building stone is abundant wherever limestone was observed.

Mr. Richardson made use of Rochon's micrometer telescope in taking his measurements; he took his bearings by means of a prismatic compass, checked by opposite readings, and used a barometer in establishing the altitudes of various points along the route he examined.

For further details respecting Richardson's examination of the country, see his Report, dated 20th April, 1871, in Geological Report, for 1870-71.

See also the following record of the thermometric observations and altitudes taken at various points of his exploration, together with a record of the temperature noted at Montreal during the time of his exploration.

THERMOMETRIC OBSERVATIONS made, and Altitudes above the Sea Level measured, during J. RICHARDSON'S Exploration of 1870.

Date.	Temperature.				Miles North of Montreal.	Height in Feet above Sea Level.	Locality.	Temperature at Montreal.		
	A.M.	°	P.M.	°				7.00 A.M.	2.00 P.M.	9.00 P.M.
June 24						217	River Ashuapmouchouan	68.8	89.6	78.9
do 25	8.00	75			220	420	do	71.4	88.1	74.2
do 26	6.30	69			226	500	do	71.1	89.9	68.8
do 27	6.30	72			230	545	do	67.7	89.4	73.0
do 28	6.30	65	1.00	72	235	853	Chaudière Falls	74.1	80.6	72.0
do 29	7.00	65	1.00	80	242	878	do	64.0	79.2	70.1
do 30	7.30	52	2.30	72	245	882	do	67.0	62.5	59.8
July 1	7.30	52	3.15	62	247	894	do	54.2	78.6	59.7
do 2	8.00	64	1.15	70	252	943	do	58.2	77.9	69.0
do 3			12.30	66	252	959	do	64.1	80.0	74.0
do 4	7.30	66	5.30	75	258	975	Chief River	65.8	87.2	72.3
do 5	8.30	62			261	1,000	do	64.2	80.9	71.1
do 6	8.00	60	6.30	62	255	1,121	do	67.8	86.4	75.0
do 7	9.15	58	3.30	56	247	1,184	do	73.0	82.4	74.0
do 8	7.15	66	3.30	60	252	1,202	Lake Ashuapmouchouan	66.0	71.0	66.0
do 9	8.15	66	3.15	58	256	1,251	Water in Lake 7.00 P.M. 60°	62.2	79.0	69.0
do 10	9.15	58	1.15	68	257	1,266	do	68.2	83.2	75.0
do 11	7.30	56	3.30	78	263	1,278	Nékoubau River	68.5	89.2	77.0
do 12	8.30	68			252	1,230	do	73.4	81.7	72.0
do 13	8.00	60			255	1,251	do	68.2	82.4	66.0
do 14	7.30	48	1.15	58	256	1,251	Kettle River Branch	65.2	78.8	68.0
do 15	7.30	58	6.20	54	257	1,266	Nékoubau Lake	62.0	82.4	68.0
do 16	7.30	55	2.15	66	263	1,278	do	62.0	81.7	72.0
do 17	8.30	58	1.30	69	270	1,224	do	68.7	88.0	77.0
do 18	8.30	62	2.00	66	272	1,206	do	74.2	92.0	77.0
do 19	8.15	56	1.30	76	267	1,288	do	70.0	90.2	75.0
do 20	8.00	64	1.00	84	269	1,329	Height-of-Land	71.1	89.2	74.0
do 21	8.15	52	1.00	66	270	1,224	Source of River Notaway	73.2	92.0	72.0
do 22	7.00	51	1.00	89	272	1,206	Lake Abatagomaw	68.7	90.3	77.0
do 23	7.30	66			273		do	50.4	87.4	79.0
do 24	9.15	68	2.30	66			do	74.7	96.1	74.0
do 25	7.30	64			279	1,205	do	72.3	84.1	73.0
do 26	7.30	60	8.30	40	282	1,254	Between Abatagomaw and Chibogomou	71.1	87.0	75.0
do 27	7.45	60	12.45	88	288	1,247	Lake Chibogomou	61.2	82.0	69.0
do 28	10.00	60			295		do	65.1	92.0	74.0
do 29	6.35	60			297		do	69.0	77.1	64.0
do 30	8.45	73					do	67.0	74.2	68.0
do 31	11.30	76	3.00	60			do	68.0	87.7	70.0
Aug. 1	8.00	50			301	1,277	do	70.0	87.1	74.0
do 2	7.30	56	2.00	54	304	1,370	Between Chibogomou and Wakinitche	58.3	74.2	64.0
do 3	8.00	65			312	1,440	Lake Wakinitche	57.6	77.2	69.0
do 4	4.75	58			317		do	68.0	86.7	74.0
do 5	7.30	58	12.30	76	330	1,395	Outlet of Lake Wakinitche	65.0	80.0	67.0
do 6	7.00	54			333	1,381	H. B. Co.'s Post, Abatigoush	66.9	73.1	72.0
do 7	9.30	67	12.00	90	58		do	69.7	86.4	74.0
do 8	8.00	66			62		do	71.1	89.4	78.0
do 9	7.00	64	2.30	80	62		do	74.2	85.2	76.0
do 10	6.30	64	12.10	78	55		do	69.6	86.2	77.0
do 11	8.00	74			52		do	71.1	89.4	78.0
do 12	8.15	68			48		do	72.1	75.4	73.0
do 13	6.45	52			308	1,440	Lake Wakinitche	65.0	68.2	67.0
do 14	9.30	48			54		do	62.0	78.0	66.0
do 15	5.30	49			42	306	do	57.1	76.2	64.0
do 16	7.10	58			52	301	Lake Chibogomou	58.4	86.1	70.0
do 17	7.30	58			297		Lake Chibogomou	65.2	82.0	72.0
do 18	6.00	48			279	1,206	Lake Abatagomaw	68.0	83.4	70.0
do 19	5.15	56			73	1,266	Lake Nékoubau	67.1	92.6	79.0

THERMOMETRIC OBSERVATIONS and Altitudes above the Sea Level—Continued.

Date.	Temperature.			Miles North of Montreal.	Height in Feet above Sea Level.	Locality.	Temperature at Montreal.		
	A.M. °	A.M. °	A.M. °				7.00 A.M.	2.00 P.M.	9.00 P.M.
Aug. 20	10.30	57	8.50	49	.....	Lake Nékoubau.....	71.4	89.6	608.7
do 21	9.30	54	11.00	51	.....	do	60.2	76.4	66.2
do 22	8.15	57	11.00	52	.....	do	61.0	71.2	65.0
do 23	8.09	55	12 noon 76	48	249	Foam Fall River.....	61.9	74.2	68.0
do 24	8.30	62	10.15	53	243	Lake Askatiché.....	67.4	85.0	72.6
do 25	8.30	62	9.40	60	232½	Foam Falls.....	69.4	78.2	73.0
P.M. °									
do 26	8.10	44	Noon 50	32	232½	do Foam Fall River....	54.6	69.9	60.0
do 27	8.30	50	10.10	60	227	Lake Normandin do	54.7	71.6	64.0
do 28	10.00	00	9.10	58	.....	do do	59.7	80.0	59.6
do 29	9.00	58	9.00	62	225½	Water-Shed between Foam Fall River and Clear Water River.	62.0	71.0	70.2
do 30	8.00	53	10.15	50	222	Clear Water Lake.....	63.0	76.3	67.0
do 31	9.00	56	10.00	40	220	Clear Water River.....	61.1	72.0	64.1
P.M. °									
Sept. 1	6.00	40	1.00 76	50	215	Lake Pemscache	60.2	80.2	70.0
do 2	7.30	48	10.25	52	210	River St. Maurice, Sandy Beach Lake...	61.1	71.1	67.0
do 3	10.30	62	10.58	58	203	do do	61.1	67.2	64.1
do 4	9.00	56	9.00	54	198	do do	60.2	67.0	61.1
do 5	5.30	48	6.00 50	47	.....	do do	56.0	75.0	58.0
do 6	6.30	45	12.00 50	31	196	River St. Maurice	50.1	77.2	59.7
do 7	7.00	37	10.00	37	195	do Kirkendatch	53.7	77.3	64.0
do 8	8.30	44	10.30	48	.....	do do	53.2	76.7	62.2
do 9	9.00	58	10.30	54	.....	do do	60.1	76.3	66.2
do 10	8.30	46	11.00	40	.....	do do	57.8	71.7	55.0
do 11	9.30	50	9.30	32	.....	do do	46.0	70.0	57.6
do 12	5.30	30	4.20 72	40	.....	do do	47.2	70.2	59.0
do 13	8.00	60	10.00	58	189	Hair-Cutting River.....	54.1	82.3	63.4
do 14	7.30	40	9.35	52	183	do do	60.1	85.1	72.0
do 15	7.00	50	9.40	44	178	Hair-Cutting Lake	62.1	84.2	68.1
do 16	7.30	40	8.00	50	167	S.E. Branch, Gatineau River...	54.6	71.1	58.0
do 17	8.00	40	9.20	48	169	do do	54.6	68.5	69.1
do 18	7.30	38	9.00	44	145	do do	58.4	86.7	56.5
do 19	6.00	31	6.00 50	41	132½	Junction of the two branches...	49.4	81.1	60.0
do 20	8.30	40	2.15 70	43	112	Gatineau River, Old Man River Branch.....	55.0	82.4	69.2
A.M. °									
do 21	6.30	38	7.30 42	43	101	516 Gatineau River, Hamilton's Farm	52.2	79.9	67.3
P.M. °									
do 22	6.30	42	6.00 64	54	89	511 Gatineau River, St. Jean de Terre.....	58.0	82.3	68.1
do 23	8.30	57	Water in river...60	42	74	394 Gatineau River, Big Eddy Portage.....	64.0	82.0	60.0
do 24	7.30	46	10.00	44	60	369 Gatineau River, Desert Branch.	53.4	68.1	63.1
do 25	9.00	54	8.30	52	.....	do do	56.2	63.0	60.2

In addition to the foregoing statement, Richardson has given a "List of Plants from north of Lake St. John," see pages 306 to 308, inclusive, in Report on Geological Survey of Canada for 1870-71, published at Ottawa in 1872.

From the North.

5. The Mistassini or the Rivière des Sables, on Charlevoix's map of 1744, is situated at its mouth in latitude $48^{\circ}40'$ per Bouchette, and at a distance of five and a-half miles north above the mouth of the Chomouchouan. Its outlet is at the most westerly point or end of the lake, at $137\frac{1}{4}$ statute miles by water through the Grande Décharge, or 136 miles through the Petite Décharge, from Tadoussac.

It is called Rivière des Sables, on account of its sandy shores and the shoals of sand extending a long distance into Lake St. John. This sand is brought down by the river, and has accumulated to such an extent that there is not more than two or three feet depth of water in the lake between the outlets of the Mistassini and Peribonca. These shoals extend as far as three to five miles into the lake, and are covered in some places with scarcely more than eighteen inches of water.

On a point near its outlet in Lake St. John, there was formerly an enormous rock resting upon five pieces of rock; it has since been carried away by ice during spring freshets.

The north-east end of the outlet is five miles north from the mouth of the Chomouchouan.

The river is three miles wide at its mouth, and is navigable thence for boats with a draught of from five to six feet for the first eighteen miles, and for canoes a distance of 120 miles from Lake St. John to the Falls; but at certain points, navigation is interrupted by rapids and cascades, along which portages must be made over precipitous rocks and through a dense forest.

At the Falls the river is confined in a narrow gorge between masses of rock, and falls eighty feet from the top of a mountain shaped like an amphitheatre, on the steps of which are trees and plants which are bathed by the waters of the cataract.

From the summit of the mountain where the Falls occur, the traveller can behold a long valley and an immense extent of level country, with numerous lakes.

The head waters of the river are in the same direction as those of the Great Lake Mistassini.

After traversing the Lac des Cygnes (Swan Lake), together with other lakes of stagnant water, and the height of land which separates the Province of Quebec from the Hudson's Bay region, the river leading to the great lake is reached.

Along the canoe route up the Mistassini to this lake, there are sixty rapids, forty-one portages, and thirty-seven lakes, which it takes three weeks to ascend and two weeks to descend. The total distance from Lake St. John is estimated at about 350 miles to the most south-westerly part of the Great Lake Mistassini, following the water route and portages.

This is the route which was formerly, and is still, followed by the Indians from the region around Great Lake Mistassini. They come to trade their furs at Pointe Bleue. They descend the river generally towards the month of June, for the purpose not only of trading, but also of meeting the missionary for their religious duties.

GREAT LAKE MISTASSINI.

This lake derives its name from the Indian word "Mista-assini," which signifies "Great Rock."

It is also named "Lac des Baies," and is shown as "Lac des Mistassins" on Charlevoix's map of 1744.

It is situated between 71° and 74° of longitude and at 51° of latitude; it is represented as being very deep and as large as Lake Ontario, but is little known.

Jérôme St. Onge, of the Eboulements, who was employed most of his life-time by the North-West Company and the "Compagnie des Postes du Roi," was stationed

several years near this lake for the purpose of trading with the Indians. He explored it in 1827. He states that it took him three days to cross the lake, which he estimates to be about 90 miles in width.

One of the Company's trading posts is situated near it. The Indians who now encamp in its neighbourhood number about eighty.

It abounds with pike, white-fish, large pickerel, and a kind of trout called by the aborigines "mingouche," which weighs as much as two large salmon, and also with wild game of every description. It is the resort of many wild animals, such as deer, caribou, bears, beavers, porcupines, etc.

It discharges through the River Rupert, about 213 miles in length, into James Bay, at the south-eastern end of Hudson's Bay.

The River Rupert, according to St. Onge, who descended it to within one day's journey from its outlet, is a much larger river than the Saguenay.

The mode of transport practised by the Hudson's Bay Company, in conveying their goods to the Great Lake Mistassini, says Bouchette, is generally in barges conducted by well disciplined men, most of whom are half-breeds. The barges are drawn across the portages on rollers. Cedar bark canoes are used in ascending small rivers, when in search of the Indians who sell furs, because birch bark fit for canoes cannot be found in that country.

In 1672, Albanel, the Jesuit missionary, as before stated, travelled the route just described from Lake St. John to the Great Lake Mistassini and Hudson's Bay.

In August and September, 1792, André Michaux, senior, the Botanist, travelled over the same route to the Great Lake Mistassini, where he arrived on the 4th of September, notwithstanding snow and intense cold. He examined portions of the lake region, and afterwards continued his journey during two days down the River Rupert to a point at a two day's journey from Hudson's Bay. His Indian guides, considering that it was dangerous to proceed any further on account of the intense cold and lateness of the season, and that it would be impossible to return when the rivers, lakes and portages were frozen over or filled with ice and snow, persuaded him to go no further.

The return journey was therefore decided on, although with great reluctance, by Michaux, towards the second week of December. It was accomplished with great difficulty, peril and hardship; but he arrived safely with his party at Tadoussac on the 1st of October, having spent about five weeks in going, and three weeks in returning, as before stated. (See Note F. 1, Part III.)

Forests of the Great Lake Mistassini and Hudson's Bay Regions, traversed by Michaux

According to his manuscripts, which he had not time to publish before his death in 1803, the trees which are so abundant in the forests two degrees further south have almost disappeared from this region, owing to the severity of the winter and the sterility of the soil.

The country is covered by numberless lakes and enormous rocks which overlay each other, and are in most cases covered with large lichens of a dark colour, which adds to the desolate appearance of these desert and almost uninhabitable regions.

Here and there, on patches of ground between the rocks, a few pine trees (*pinus upstris*) of stunted growth are found, which barely attain a height of three feet. This tree, at 150 miles further south, attains its full growth of from eight to ten feet, which it seldom exceeds.

Brunet states that the manuscript journal of Michaux contains a very interesting description of the vegetation and climate of these northern regions.

It is highly desirable, in his opinion, that the Government, or some public institution should get a copy of this manuscript, which would be not only interesting but very serviceable to Canada. (See Note F. 1, Part III.)

In 1828, Bouchette ascended the River Mistassini a distance of ten miles from its outlet.

This river, he says, is extremely shallow, which with the wretched soil on each side seems to be in some way compensated for by the beauty of its width, its islands and its woods, which have induced a traveller to call the Mistassini "a magnificent river."

The timber close to its banks consists of spruce, cypress, white birch, and a few elms.

From the testimony of Mr. Verrault, it would appear that the tract of land between the course of this river and the Ashuapmouchouan is unfit for cultivation but Bouchette, who visited this river after him, thinks, from the proximity of those rivers, and from the general aspect of the country, that there is, nevertheless, considerable proportion of land fit for cultivation.

The Mistassini is formed by the junction of two rivers, the Ouascheiamiscou, or Rivière des Iquets, with thirty falls, per Charlevoix, and the River Katchissagan, and also by the Lac des Mamelles and the Lac des Cygnes (marked "Lac des Signes" on Charlevoix's map), situated between the two rivers, and discharging into the Katchissagan. (See Notes E. F. 1, F. 2, G, 1, G. 2, and H.) (See also Notes A, B, C respecting Hudson's Bay and Arctic Regions in part III.)

Mr. A. F. W. Blaiklock, P.L.S., made a topographical survey of the river Mistassini, for more than 100 miles from Lake St. John, for the Government in 1866. (See Note R., in Part III.)

In 1870, as before stated, Richardson ascended the River Ashuapmouchouan to the height of land between the head waters of this stream and of the river Mistassini and thence to the Hudson's Bay's post on the southern extremity of Abatagush Bay on the Great Lake Mistassini. After giving a geological description of the country he traversed, he states that the land in the region of the Great Lake is a level plain not more than thirty feet above the level of the lake, and that the soil, which is calcareous, is fertile and excellent for cultivation.

In 1871, Mr. Walter McOuat afterwards made a geological examination of the country, through the valley of the River Mistassini, across to the main branch of the River Ashuapmouchouan, thence up to and across the height of land to Cabistachuan Bay, at a point nine miles to the north-eastward of the southern extremity of Abatagush Bay, at the Hudson's Bay Company's post, at seventeen miles beyond which Richardson terminated his measurements the previous year, on the Great Lake Mistassini.

The distances along the route he followed, if measured on straight lines from one point to another, are as follows, viz.:—

	Miles.
1. From Lake St. John, up the Mistassini to the point where he left the river (105 miles by water). Course north 13° west.....	80
The distance on a straight line to the Great Lake Mistassini, on a bearing north 50° west, is 61 miles, although the distance actually measured was about 90 miles, from the point where he left the river.	
2. From the River Mistassini, across to Chief River on the main branch of the Ashuapmouchouan. Course north 80° west.....	28
3. From the Chief River to the height of land. Course north 25° west.	35
4. Ridge forming water-shed, with a small lake each side, one discharging into the Ashuapmouchouan and the other into the Great Lake Mistassini.....	$\frac{1}{2}$
5. From Height of Land to Cabistachuan Bay, on Great Lake Mistassini, on a course north 60° west.....	5 $\frac{1}{2}$
Total, Lake St. John up to Great Lake Mistassini.....	148 $\frac{1}{2}$
Coast line, measured along Great Lake Mistassini, about.....	150
Total measurement along straight courses above stated, and along coast of lake, as measured by McOuat, in August and September, 1871.....	298

The following details respecting McOuat's journey and exploration of the country up to the Great Lake Mistassini, are according to the Geological Report for 1871-72:

On the 10th June, 1871, he left Montreal for the purpose of making, in company with Mr. John Leitch, a geological exploration of the country to the north and north-west of Lake St. John, on the Saguenay, and extending to, and embracing a portion of Lake Mistassini, and arrived at Lake St. John on the 17th.

Their departure from the lake was seriously delayed by the unusual lateness of the spring in that region, and other causes, for which they did not leave Lake St. John until the 13th of July.

Selection of Route.

After careful inquiry they concluded that the only practical route by which some idea of the distribution of the copper-bearing rocks, mentioned in Mr. Richardson's report of the previous year, could be obtained, considering the shortness of the season, would be by way of the Mistassini River.

Ascent of the Mistassini River.

They accordingly ascended the Mistassini for 105 miles to a point bearing north 13° west from its mouth, and distant, in a straight line, eighty miles. At this point they left it on the west side; and there also they commenced their survey, the Mistassini River having been previously surveyed by Mr. Blaiklock, P. L. S. The distance from this point to Lake Mistassini, in a straight line, is sixty-one miles, in a bearing north 50° west, although the distance actually measured was about ninety miles. They struck the lake at the end of a long narrow arm, called Cabistachuan Bay, and about nine miles to the north-eastward of the southern extremity of Abatagush Bay, where Mr. Richardson's line comes upon it. Continuing their measurements along the lake, their survey was connected with that of the previous season at the Hudson's Bay Company's post, where they arrived on the 14th of August, thirty-three days from the time of their departure from Lake St. John. They set out from the post to make a survey of such portions of the lake as the time at their disposal would permit, and on the 14th of the following month they returned to the same place. On the 20th they left on their homeward journey, reaching Lake St. John on the 7th, and Montreal on the 22nd of October.

Mistassini River to Chief River or Main Branch of the River Ashuapmouchouan.

The first portion of their survey—that from the Mistassini River to the lake of the same name—may be divided into three parts. The first extends to the Chief River, mentioned in Mr. Richardson's report as the main branch of the Ashuamouchouan, the distance, in straight line, being twenty-eight miles, in a bearing north 80° west. Rather more than half way the line on this part crosses the Wassiemska, which appears to be nearly as large as the Mistassini, into which it flows.

Chief River to Height of Land.

The second part is from the last mentioned point to the height of land between the St. Lawrence and Hudson's Bay waters, the distance being thirty-five miles, and the bearing north 25° west. The Chief River, about a mile above where their line strikes it, divides into two branches, which are nearly equal in size. The most westerly of these they surveyed for about twenty miles above the fork. The general course is nearly north and south. This is also the course of nearly all the small streams, tributaries of the Ashuapmouchouan, between this and the height of land, many of which are crossed obliquely by the line just defined. Both this line and the preceding pass entirely over a Laurentian country. The rocks are mostly grey, moderately fine-grained, micaceous gneiss, with considerable dark green, hornblende gneiss, interstratified, usually in layers from one inch to a foot thick.

From the Height of Land to Lake Mistassini..

The remaining distance from the height of land to Lake Mistassini is the last of the three parts into which the whole exploratory line is divided. The distance, in a straight line is only five and a-half miles, and the bearing north 60° west. The ridge forming the water-shed is about ten chains wide, and, where they crossed it, has a small lake on each side, that on the south-east side discharging by a stream which is tributary to the Ashuapmouchouan, and the other sending a contribution to Rupert's River through Lake Mistassini. They descended to within a mile of Lake Mistassini by a small rapid river called Little Perch River. About three miles from the lake, this stream falls about sixty feet over an escarpment facing to the north-west and overlooking a comparatively level tract of country, extending in that direction as far as the eye can reach. The rock in this escarpment is grey gneiss, similar to that already described, and dipping about 50° in a course south 65° east. About a mile to the westward, and within about two miles of the lake, hard, bluish-grey limestones are met with. These are the flat limestones of Lake Mistassini, mentioned in Mr. Richardson's report as the northernmost of the three successive groups of rocks crossed by his exploratory line.

About midway between the last exposure of gneiss and the first of limestone, a distance, as already stated, of about a mile, there are some small exposures of a reddish feldspathic rock, apparently of a brecciated character, with calcareous seams, and showing a considerable amount of a dull green steatitic mineral.

LAKE MISTASSINI.

The surveys on Lake Mistassini constitute the second of the two divisions into which their season's work naturally divided itself. They measured on this lake a coast line of about 150 miles, including no bays less than a mile in width. A long, ragged tongue of land, upwards of twenty miles in length, running from the south-west end, divides that end of the lake into two parts; and, of these the one on the south-east side divides into several long, narrow arms, which are out of the general direction, having a nearly north and south trend. A series of long narrow islands, which were seen only from a distance, extends for many miles in the same direction, beyond the above mentioned point, being, like it, apparently parallel with the longer axis of the lake, the whole length of which cannot be much, if any less than 100 miles, the narrowest width appearing to be about fifteen miles.

All the rocks met with on the lake are the flat limestones already mentioned. These strata appear to occur over the whole area occupied by the lake, but they are bounded all along the north-west shore by Laurentian gneiss.

Character of the Land.

The character of the land is much the same as that described by Mr. Richardson in his report of the previous year, 1870.

Moose Factory.

Moose Factory, on the west side of James' Bay, some ninety-five miles to the westward of Rupert House, near the outlet of the River Rupert, on the east side of the same bay, is situated at about 51° of latitude and 81° of longitude. Its average summer temperature is $62^{\circ} 20'$, that of Quebec being $61^{\circ} 40'$, and that of Ottawa 64° , although Quebec is about 4° and Ottawa $5\frac{1}{2}^{\circ}$ further south. Professor Be says that upwards of eighty head of cattle are kept, together with horses, pigs and sheep, at Moose Factory.

See Notes, A, B, C, respecting Hudson's Bay, York Factory, and the Arctic Regions, in Part III.

From the East North-East, on the North Side of Lake St. John.

6. The *Peribonca*, Indian name for "Singular or curious river," on the northernmost portion of the shore of Lake St. John, called "Periboak" by Charlevoix.

The outlet of this river, according to the most recent map published by the Crown Lands Department of Quebec, in 1880, is at $48^{\circ} 42'$ of latitude, and is ten and a-half miles north-eastward, below the outlet of the Mistassini, nineteen and one-quarter miles above the outlet of the lake at the Grande Décharge, and twenty-one and three-quarters miles from that of the Petite Décharge. It appears to be narrower than that of the Mistassini, because it is bordered upon its west side by a point of land connected with shoals of sand, which are submerged only during the season of high water; several of them are covered with willows (*saules*) and dwarf elms (*ormeaux*).

On the east side of the outlet the sand banks are covered with wild hay. They are formed by successive accumulations of sand during south-westerly winds, and are afterwards flattened and shaped into nearly parallel ridges by the north-westerly winds; these ridges, by subsequent deposits, become connected with the mainland at the outlet, whence they extend gradually from year to year into the lake.

The river is of small depth, but the channel which winds along its eastern shore is deeper than that of the Mistassini, where the draft is from 5 to 6 feet on the first 18 miles. It is navigable for a distance of about 9 miles up to the first falls.

Bouchette examined this stream in 1828, and gives the following description of it:—

"The mouth of this river is on the northernmost point of Lake St. John, viz., in latitude $48^{\circ} 42' 47''$, and its course is from the east-north-east; it is about 45 chains wide, and the current is moderate as far as the falls, which are about 9 miles from its mouth. These falls are three in number, and above them is the Lake d'*Ahaouiloo* or *Na-d'haoui-lo*, about 4 miles long and one wide.

"This river may be said to be the most beautiful, and that which offers the most advantageous site for a settlement, of all the rivers in that part of the country.

"Its banks are level and wooded with a mixture of aspen, white birch, red and white pine, with cypress.

"The higher this river is ascended, the better the land appears to be."

On the North Side of the Lake.

7. The *Cacouatimi* (Owl River).

8. The *Mistassibi* (Great River).

None of the above named rivers, it is stated, are narrower than the River St. Charles, which flows past Quebec.

The rivers on the north side of Lake St. John have not yet been explored up to their sources; the explorations, however, are being extended from year to year.

Besides the above named tributaries, there are several minor streams which discharge into the lake.

One of these from the south, is the *Kouspaiganitch*. Its outlet is at the south-east end of the lake, at about one-third of a mile westward from the village of St. Jérôme.

Another is the Ouiatchouanish, on the south west side of the lake, at a little more than half a mile north of "Notre Dame du Lac."

APPENDIX No. 8

PART II.

RIVER SAGUENAY
— AND —
TRIBUTARIES, ETC.

PART 2.

OUTLETS OF LAKE ST. JOHN AND THE RIVER SAGUENAY.

The River Saguenay named "Pitchitanichetz" by the Indians, flows from the north-east end of Lake St. John, and falls 40 to 50 feet, says Bayfield, through two narrow and rugged channels, the most northerly of which is called the Grande Décharge, one mile wide at its mouth, and 9.56 nautical or eleven statute miles in length; and the other, or the most southerly, the Petite Décharge, half a mile wide at its mouth and 8.48 nautical or 9.75 statute miles in length.

These two outlets are separated from each other by Ile Alma, at the foot of which they unite and form what is called the River Saguenay, which flows eastward with great velocity for the first 29.58 nautical, or 34.02 statute miles, and with many falls, cascades and rapids down to Terres Ronpues, at the head of the tide, and navigation, 6.07 nautical, or 6.98 statute miles above Chicoutimi.

The remainder of the river in its course becomes uniform and regular down to Tadoussac, where it empties into the St. Lawrence between Pointe aux Vaches on the north-eastern, and Pointe aux Alouettes, composed of low clay cliffs on the south-western side, from each of which, dangerous reefs project into the St. Lawrence.

Tadoussac is situated at the following distances, viz.:

	Nautical Miles.	Statute Miles.
From the mouth of the River Mistassini, at upper or western end of Lake St. John, passing through the Grande Décharge, and thence on a straight line across the lake.....	119.32	137.2
Below the mouth of the Grande Décharge, at the foot or eastern end of Lake St. John.....	97.58	112.2
Below Chicoutimi.....	61.93	71.2
Below St. Alexis, at head of Baie des Ha! Ha!.....	52.40	60.2
Below Quebec.....	106.00	122.2

IMPROVEMENT OF THE GRANDE DÉCHARGE.

The narrowest portion of the channel, at a distance of about three-quarters of a mile below the foot of Lake St. John, is being widened, through solid rock, for the purpose of increasing the outflow of water from the lake during spring freshets, which cause great injury to the lands around it and retard their cultivation from time to time to three weeks (See No. 10.666, of 29th December, 1880, calling for this improvement).

The bed of the channel is not to be deepened, and the water of the lake is to be maintained at its ordinary elevation during summer.

This work was commenced in 1881, and has since been continued by the Dominion Government, under the Department of Public Works, which has control of the principal works on the Saguenay.

As there is no correct chart of Lake St. John as yet, it is very desirable that the lake should be surveyed and sounded, and that the supply of water from its tributaries should be ascertained, together with the outflow through the Grande and Petite Décharges. These should be measured, sounded and levelled, with accuracy along the portions which obstruct the discharge of water during spring floods.

The best means of diminishing the elevation and duration of the floods could afterwards be determined on with greater accuracy and better chances of success.

Every year, during spring, the water of the lake rises from 15 to 20 feet, and sometimes as much as 30 and 34 feet above its summer level.

According to Joseph Rosa's estimate, it will be necessary to remove at least 83,000 cubic yards of solid rock, in order to widen and improve the most obstructed and narrowest portions of the channel (See No. 30,975, of 27th December, 1882).

The expenditure on the work, since its commencement, in 1881, has been, viz.:—

For one steam engine and boiler, three steam drilling machines, one drilling machine, without steam, one electric battery and wire, 300 pounds dualine, forty octogonal bars of cast-steel, for mining, the sum of.....	\$4,200 00
For mining 400 cubic yards of rock, cutting 600 cords of wood, clearing four sup. arpents of land, building log shanties, and blacksmith's forge, opening a winter road across Ile d'Alma, etc.....	2,403 16

Total expenditure up to 1st July 1882\$6,603 16

WORKS ON THE PETITE DÉCHARGE.

They consist of the following, viz.:—

Seven flat dams of a total length of 930 feet, of various widths, and an average height of 16 feet. First built, 1856 to 1860. Dam No. 7 was carried away in 1876, when Lake St. John rose 34 feet. It was rebuilt in 1881-82. Dam No. 1 was burnt in 1877, and rebuilt in 1878-79.

One pier dam, 60 feet long, 10 wide, 14 high. Built 1856 to 1860. Afterwards repaired.

Two glance piers, 40 to 50 feet long, 8 to 14 wide and 14 high. Built 1856 to 1860. Afterwards kept in repair.

One bulkhead, 50 feet long, 26 wide, 38 high. Part of it carried away by the great flood of Lake St. John in 1876, and afterwards temporarily repaired by Messrs. Price & Co. Rebuilt in 1881-82.

One slide for single sticks. It has been shortened since it was first built. It is 5,026 feet long, 5 wide, 5½ high at upper end, and 2½ high at lower end. This slide rests upon a series of piers and trestles. First built 1856 to 1860. In 1876, when the lake rose 34 feet, the slide was destroyed for a total length of 1,800 feet, of which 936 feet at upper end near the bulkhead, and 864 towards the lower end. It was afterwards temporarily repaired by Messrs. Price & Co. In 1880-81, 1881-82, it was reconstructed by the Government for a total length of 1,239 feet.

Three anchor piers, 12x12x12 feet. Built 1860-61. Since kept in repair.

Booms, 1,344 feet long, 26 inches wide, 14 inches thick. Built 1856 to 1860. Afterwards widened and kept in repair—150 feet long, 15 inches wide, 12 inches thick. Built, 1880-81.

Storehouse and Superintendent's dwelling, 40 feet long, 24 feet wide. The store house was built in 1865-66, and was afterwards enlarged from 24x24 to the present dimensions, so as to provide a proper residence for the slide master.

The above works, on the Petite Décharge were constructed by the Government for the purpose of passing timber from Lake St. John down the River Saguenay, where it is manufactured at the saw mills of Chicoutimi and the Baie des Ha! Ha! in the shape of deals, boards, scantling, window frames, doors, laths, etc., etc., and afterwards exported, chiefly to Europe.

The works extend from the mouth of the Petite Décharge, at the foot of the lake, down to Gagnon's Rapids, for a distance of six miles.

The mouth of the Petite Décharge is 21.52 nautical, or 24.75 statute miles, on a straight line across the lake, from the mouth of the River Mistassini, which is situated at the west end or head of Lake St. John.

	Nautical Miles.	Statute Miles.
Mouth of Petite Décharge to Chicoutimi, by the river.....	34.57	39.75
Mouth of Petite Décharge to Tadoussac, by the river.....	96.50	110.97

Expenditure on Slide, Piers, Dams, Booms, etc., on the Petite Décharge.

Construction, 1856 to 1st July 1867.....	\$44,872.79	
“ 1st July, 1867 to 1st July, 1882.....	2,418.50	
		\$47,291.29
Repairs and Renewals, 1856 to 1st July 1867.....	1,387.04	
“ 1st July, 1867 to 1st July 1882.....	36,371.73	
		37,758.77
Staff, 1856 to 1st July, 1867	5,024.13	
“ 1st July, 1867 to 1st July, 1882.....	12,080.64	
		17,104.77
Total from commencement in 1856 to 1st July, 1882...		<u>\$102,154.83</u>

DESCRIPTION OF THE RIVER SAGUENAY, ACCORDING TO THE ADMIRALTY SAILING DIRECTIONS PUBLISHED IN 1860 AND THE CHARTS PUBLISHED IN 1864.

The Saguenay was little known, in a nautical point of view, before the Admiralty survey of it in 1829, by Bayfield.

This river flows from Lake St. John, and is supplied by many large tributaries which empty into it, from the north and north-west.

It discharges the water of Lake St. John into the St. Lawrence, to which it contributes a quantity of water, only inferior to that which is supplied by the Ottawa.

“This very remarkable and extraordinary river,” says Bayfield, “resembles a long and narrow mountain loch, for the first 52.40 nautical, or 60.26 statute miles, from its confluence with the St. Lawrence at Tadoussac up to the head of the Baie des Ha! Ha!”

“In this distance the Saguenay is from three quarters of a mile to two and a-half miles wide, filling up a deep transverse valley through mountains of sienitic granite and gneiss. These mountains rise everywhere, more or less abruptly from the water forming in some parts precipitous headlands more than 1,000 feet in height, and these when seen one beyond the other, up magnificent reaches of many miles in length, give rise to scenery which, although wild and barren, is yet full of grandeur and beauty. The granitic hills are in general quite barren, but the valleys through which the rapid tributary streams descend, are filled with a deep deposit of sand and clay, and are thickly wooded. From the Baie des Ha! Ha! up to Chicoutimi and Lake St. John, and around this lake, there are extensive tracts of excellent land.”

“Within the same part of the Saguenay the water is almost as deep as the mountains are high. Between the shoals at the entrance of the river there is a bar across, on which, however, there are from eighteen to twenty fathoms of water, but immediately within the river the depth increases to upwards of 100 fathoms, and farther up, for a distance of many miles, it is fully 145 fathoms deep in the centre of the channel, decreasing to 100 fathoms on either side often within less than as many feet off the precipitous shores. It is this enormous depth, its mountainous shores and its impetuous stream that have rendered the Saguenay so celebrated, and that entitles it to be classed among the most remarkable features in the geography of Canada.”

"The bed of the Saguenay, for many miles, is sunk more than 100 fathoms below that of the St. Lawrence at their point of junction, so that if the waters were to fall sufficiently to lay dry the bed of the latter river, there would still remain a depth of more than 100 fathoms in the Saguenay."

"There are anchorages occasionally, but they are some miles apart, and there are none, of course, in the great depths between them. In the case of a vessel becalmed, however, there would be little or no danger, since there are no shoals in the channel when once within the entrance, and a boat ahead would serve to keep her clear of the shore. In some parts, perhaps, but not often, a line might be made fast to the rocks."

"The Saguenay is navigable for the largest ships up to Pointe aux Roches, fifty-five nautical or 63.25 statute miles from the St. Lawrence at Tadoussac, and schooners, with the assistance of the flood tide, can ascend to Chicoutimi, eight statute miles farther. Just above this point the river becomes suddenly very shoal, there being only one and a fourth fathoms water in its narrow and intricate channels, and among its shoals, composed of large boulders. Above this shallowest part, where at low water there is a complete rapid, the depth varies from two to eight fathoms, but between shoals of large stones, and the river contracts to little more than a quarter of a mile, retaining that breadth nearly to the rapids, six nautical or 6.9 statute miles above Chicoutimi, where the tide ends at Terres Rompues."

TIDES.

On account of the obstructions occasioned by the numerous promontories along the river, the tides are much later than in the St. Lawrence; at low water in the latter, the force of the descending stream from the Saguenay is felt for several miles.

"It is high water, full and change, at Tadoussac, at the entrance of the Saguenay, at 2 h. 45 m., and the rise in ordinary springs is 17 feet, and in neaps 10 feet. At Chicoutimi it is high water at $4\frac{1}{2}$ hours, and the rise in ordinary spring and neap tides is 12 and 8 feet."

The meeting of the spring ebb tides down the Saguenay and the St. Lawrence causes breaking and whirling eddies and rippings, so strong as to interfere with the steerage of a vessel, unless she has a commanding breeze. These streams, opposed to a heavy easterly gale, cause an exceedingly high, cross, and breaking sea, in which no boat could live, and which is even considered dangerous to small vessels. On the flood, at such times, there is not more sea there than in other parts of the river.

The general bearing of the river from its outlet at Tadoussac, is west-north-west.

The prevalent winds are north-east and north-west, the north-westerly wind is the most frequent and the most favourable for vessels descending the river; its blows occasionally with tremendous force.

In winter the Saguenay is generally frozen over from the Terres Rompues to a point three miles below Chicoutimi, and from Baie des Ha! Ha! down towards the Iles St. Louis, from the middle of December to the first or second week of May.

Navigation closes about the middle of November.

The first trip of the passengers' steamers varies from the 5th to the 12th of May, and the last trip from the 14th to the 17th of November, between Tadoussac and Chicoutimi.

The depth, width, tides, and anchorages along the navigable portion of the River Saguenay, and the works executed, in progress or projected at the various points between Terres Rompues and Tadoussac inclusive, may be described as follows, viz:—

1. Terres Rompues.

Where the tide ends, distance from Tadoussac 68 nautical miles or 78.20 statute miles. From Terres Rompues down to Ste. Anne on the north shore opposite the mouth of the River Chicoutimi, a distance of 5.20 nautical or 5.98 statute miles,

the river is navigable only for small vessels of from 5 to 6 feet draught during high water neaps.

2. *Ste. Anne.*

On north side of the river, distance from Tadoussac 62·80 nautical or 72·22 statute miles. From Ste. Anne to the town of Chicoutimi, on the opposite side of the river, a distance of about 0·87 nautical or 1 statute mile, the navigable draught varies from 6 to 12 feet; the river was much deeper but has been obstructed by slabs and saw-dust to a considerable extent.

The Dominion Government have been urged during the past three years to construct a pier here for the accommodation of the inhabitants on the north side of the river, who come to Chicoutimi which is their principal market and the last landing place of the Quebec steamboats.

The population of Ste. Anne according to Census of 1881, is 1,260.

Ste. Fulgence, nine and a-half statute miles by the public road below Ste. Anne, and upon the south side of the Saguenay, has a population of 845.

3.—TOWN OF CHICOUTIMI,

On the South Shore of the River Saguenay.

	Nautical Miles.		Statute Miles.
Distance from Tadoussac, by the river.....	61·93	=	71·22
Distance below mouth of the Grande Décharge, at east end of Lake St. John, by the river.	35·65	=	41·00
Distance below mouth of the Petite Dé- charge, at east end of Lake St. John, by the river.....	34·57	=	39·75
Distance from the mouth of Petite Décharge, across Lake St. John, to the mouth of the River Chomouchouan, at west end of Lake St. John.....	21·74	=	25·00

Variation observed by Bayfield, at the Trading Post near the mouth of the River Chicoutimi, in 1829, 19° west.

Magnetic variation, per Orlebar, in 1871, increasing four minutes annually.

Latitude of Trading Post, observed by Bayfield.....	48° 26' 5" N.
Longitude of Trading Post, observed by Bayfield, during Admiralty Survey, of 1829.....	71° 4' 48" W.
Latitude of Chicoutimi, taken by Capt. E. Deville, P.L.S., in 1877, on the property of V. M. Martin, near the main street. (<i>See Report Commissioner of Crown Lands, Quebec, 1877.</i>) See Note R., Part III.....	48° 25' 48"

	Nautical Miles.		Statute Miles.
Width of the Saguenay, at Chicoutimi.....	0·45	=	5·18
Depth of water, opposite Chicoutimi, during low water ordinary spring tides.....			12 feet.
Population of the Town of Chicoutimi, according to the Census of 1881.....			Souls. 1,935
Population of the adjoining Parish of St. François-Xavier, in 1881.....			2,687

The Town of Chicoutimi, is the *chef-lieu* of the Counties of Saguenay and Chicoutimi. Its principal buildings are the cathedral, college, court house and gaol, marine hospital and convent.

CHICOUTIMI PIER.

The pier at Chicoutimi is situated at the end of a cross-street, leading up to the convent, cathedral and marine hospital, at about three-quarters of a mile below the court house and one mile below the former trading post of the Hudson's Bay Company, near the outlet of the River Chicoutimi.

It was commenced in 1873, by the St. Lawrence Tow Boat Company, and completed by the Dominion Government to whom it was handed over in 1874.

From 1874 to 1882 inclusive, it has been extended and improved, and a storehouse of 20 x 10 feet, with a waiting-room or office has been erected on its west wing at the outer end. At the end of the approach to the pier, and upon the west side there is another storehouse for freight, measuring 40 x 24 feet.

The pier now measures 282 feet in length with a width of 30 feet for the first 248 feet, and of 127 feet for the last 34 feet of its length; it is thus provided with a wing on each side at its outer end.

The depth of water at the end of the pier, during low water, was originally 10 feet, but has since been reduced to 7 feet by slabs and saw-dust from the mills at the mouth of the River Chicoutimi, one mile above it.

High water at full and change, Chicoutimi, per Bayfield, 4 h., 2 m.

	Feet.	Inches.
Rise of ordinary spring tides per Bayfield.....	12	
“ “ neap tides “ “	8	
Depth of water at end of pier during high water of ordinary spring tides.....	19	
Depth of water at end of pier during high water of ordinary neap tides.....	15	
Depth during low water ordinary spring tides.....	7	
Height of pier at outer end as built.....	28	
“ “ above extreme high water.....		6

Total expenditure by Dominion Government up to 1st July, 1882, \$17,017.61.

One of the St. Lawrence Navigation Company's steamers, from Quebec, calls twice a week at the Chicoutimi pier, during the season of navigation, with passengers, freight and the mail.

At the mouth of the River Chicoutimi, about one mile above the pier, there is an extensive lumbering establishment belonging to the Messrs. Price, who export large quantities of sawed lumber, laths, shingles, etc., etc., from Chicoutimi harbour to Europe and elsewhere, in ocean vessels and large schooners which ascend the Saguenay to this locality.

Marine Hospital.

This building is a brick structure, two stories in height, with a stone basement, 35x45 feet, situated on the top of the hill in rear of the College, and is opposite the stone monument erected in memory of the late William Price. The Hospital was commenced in 1882, and will be completed in 1883. (See Report of Chief Architect for further details.)

Channel Improvements.

From the Dominion Government pier at Chicoutimi down to Pointe aux Roches, on opposite or north side of the Saguenay, a distance of 6.93 nautical or 7.97 statute miles, the depth of the channel varied formerly from 2 to 4 fathoms, or from 12 to 24 feet, during low water of ordinary spring tides.

The channel has been hitherto, and is still, partly obstructed by saw-dust, slabs, loose boulders, and shoals of gravel and clay, so that vessels coming to load timber at the River Chicoutimi mills, one mile above the pier, or at the Rivière du Moulin, three-fourths of a mile below the pier, can only pass with safety during high tide, as they draw generally from 15 to 18 feet of water. The channel, besides being obstructed, is crooked, and the current through it runs at the rate of from four to five miles an hour during low water; so that even the mail steamers have to wait for high water before approaching the pier, and even then extreme caution must be used.

At the place where vessels used to load, opposite the River Chicoutimi mills, there was formerly sufficient water for a draught of 18 feet at low water; this depth has since been reduced to 6 feet, owing to slabs and saw-dust from the mills. The practice of throwing slabs, however, into the river has been discontinued during the past few years; but not before the entire channel from the mouth of the River Chicoutimi down to the mouth of the Rivière du Moulin, and four to five miles lower down, towards Pointe aux Roches, had been more or less obstructed, and its depth diminished to about 6 feet during low water.

The removal of these obstructions for a width of 350 feet, and the straightening of the channel from Pointe aux Roches upward, was commenced in 1879, and has since been carried on by means of divers, scows, and a bateau fitted up as a temporary spoon dredge.

The channel has been cleared for a distance of $2\frac{1}{2}$ miles, from which a great number of boulders has been removed. These measure from one-half to six cubic yards, and in some cases nearly 100 cubic yards. In the same distance, shoals have been removed at the worst points for a total length of about 2,700 feet, and a width of 300 feet.

The total expenditure by the Dominion Government on the improvement of the channel up to 1st July, 1882, is \$13,559.94.

The length of channel remaining to be cleared up to Chicoutimi pier is about one mile.

The entire work, if continued up to the last named point, can probably be completed in 1883.

Sea-going vessels can afterwards ascend to Chicoutimi pier with a draught of nearly 10 feet during low water, or with a draught of 18 feet during half tide.

No less than from twenty-seven to forty-five ocean vessels, besides many large schooners, have come to load lumber at the mills above and below the town, every year, since 1872 inclusive. From 1872 to 1879 the number varied from seventeen to forty-three.

For further details, see statements P and Q, appended hereto.

DOMINION TELEGRAPH LINE FROM CHICOUTIMI TO BAIE ST. PAUL, NINETY-TWO MILES IN LENGTH.

This work was commenced in August, 1880, and completed on 1st September, 1881.

The various stations and intermediate distances along the line are as follows, viz.:

	Intermediate Distance. Statute Miles.	Total Distance. Statute Miles.
Chicoutimi, south side of River Saguenay.....	0-00	0-00
St. Alphonse de Bagotville, at west end of Baie des Ha! Ha!	11-50	11-50
St. Alexis de la Grande Baie, at south-west end of Baie des Ha! Ha!	3-00	14-50
Petit Lac des Ha! Ha!	31-50	46-00
St. Urbain.....	37-00	83-00
Baie St. Paul, north side of River St. Law- rence.....	9-00	92 00

Total cost of construction up to July, 1882, \$12,481.02.

At Baie St. Paul this line connects with that of the Montreal or Great North-Western Company's line.

Telegraph offices have been opened at Chicoutimi, Petit Lac des Ha! Ha!, Urbain and Baie St. Paul.

For further details see sheets I, J1, J2, appended hereto.

Lighthouses.

Between Chicoutimi and Pointe aux Roches there are five pairs of white range lights—three on the north and two on the south side of the Saguenay, for the guidance of vessels up the channel to Chicoutimi Harbour.

There is also a small light on the pier.

The lighthouses of each pair of range-lights are from 128 to 303 yards apart, and are from twenty-five to forty-three feet in height.

They were first lighted in 1873, and are visible at distances varying from two and a-half to five miles. The lights are "Fixed" white lights.

4. Pointe aux Roches, on north shore of River Saguenay.

	Nautical. Miles.	Statute. Miles.
Distance from Tadoussac.....	55.00	63.25
Width of the river at Pointe aux Roches.....	1.50	1.73

Depth of the river at Pointe aux Roches during low water of ordinary spring tides, three and a-half fathoms or twenty-one feet.

The Bay at Pointe aux Roches is what Bayfield calls the last anchorage up the Saguenay. The depth of water in the Bay varies from twenty-one to 120 feet or more.

The river above this point contracts rapidly, assuming, at the same time, the usual character of a river, with mud-banks on either side, dry at low water, shoals of large boulder stones, drift trees, etc. The water also becomes fresh when the tide is out.

From Pointe aux Roches down to the next anchorage, at Petits Ilets, a distance of five nautical or 5.75 statute miles, the width of the river varies from 1.50 to 1.90 nautical or from 1.73 to 2.19 statute miles, except at one high rocky point, where it is only 0.80 nautical or 0.92 statute miles in width, and the depth of water varies from three and a-half to sixty fathoms.

From the high rocky point just mentioned to within a mile of Pointe aux Roches, on the north side of the river, there is good anchorage in any depth out to twenty fathoms.

5. Petits Ilets on the north shore of the river.

	Nautical. Miles.	Statute. Miles.
Distance from Tadoussac.....	50.00	57.50
Width of river at Petits Ilets Point.....	1.60	1.84

Depth at centre of river, opposite Petits Ilets, during low water ordinary spring tides, fifty-four fathoms or 324 feet.

They comprise three small rocky islets joined to the shore at low water, at three and a-half nautical or 4.02 statute miles above Cap à l'Est.

The Bay on the east side of them forms a small but secure anchorage. The depth of water of this anchorage is from 6 to 17 fathoms, with a mud bottom.

From Petits Ilets down to Cap à l'Est, the width of the river varies from 1.90 to 1.40 nautical, or from 2.19 to 1.61 statute miles. Between Cap à l'Est and Cap à l'Ouest the width is 1.80 nautical or 2.07 statute miles.

The depth of the river along the centre of the channel, from Petits Ilets to Cap à l'Est, varies from 54 to 87 fathoms.

	Nautical. Miles.	Statute. Miles.
Cap à l'Est, above Tadousac, is.....	45.00	= 51.75
Cap à l'Ouest, " "	46.60	= 53.59
Width of river below Baie des Ha! Ha! from Cap à l'Est.....	1.60	= 1.84
Width of river at lower end of Baie des Ha! Ha!, opposite Cap à l'Ouest.....	1.40	= 1.61
Depth at centre of river, opposite Cap à l'Est....	118 fath's or	708 ft.
Depth " " " Cap à l'Ouest.	80 "	480 ft.

6. *Baie des Ha! Ha!, called "Heskuewaska" by the Indians.*

	Nautical. Miles.	Statute. Miles.
Head of Bay, below Chicoutimi.....	22 33	= 25.68
Head of Bay, above Tadousac	52.40	= 60.26
Foot of Bay, " "	46.60	= 53.59
Length of Bay from west or upper end down to Cap à l'Ouest, at lower end.....	5.80	= 6.67
Width of Bay at west or upper end.....	2.50	= 2.88
Width of Bay at east or lower end.....	1.20	= 1.38

Depth of Bay, 5 fathoms, near shore at the head or west end, increasing to 80 fathoms to the foot, opposite Cap à l'Ouest.

Four considerable streams fall into the Bay at its head.

The best anchorage in the Baie des Ha! Ha! is on either side of a small islet joined to the shore, at low water, in the south-west corner of the Bay, and from 7 out to 30 fathoms on a clay bottom. There is room for any number of vessels, but they are rather exposed to easterly winds, which blow up the river.

This extensive harbour is sheltered by mountains on its north, west and south sides.

Latitude Baie des Ha! Ha! at head of Bay.....	48° 22'
Longitude, " "	70° 11'

Per Admiralty Chart of 1860, corrected to 1871.

There are two villages and extensive settlements around the Baie des Ha! Ha!

7. *St. Alexis de la Grande Baie.*

On the south side, with an extensive lumbering establishment belonging to the Messrs. Price & Co., which has been in operation during the past fifty years or more. The population of the Parish of St. Alexis, according to the Census of 1881, is 1,749.

At the time I first visited this place, in 1837, there was a church, saw mill, and several dwellings, and three ocean vessels loading with timber in the harbour.

Nine or ten ships have gone there for lumber every year, up to the present time.

The mills manufacture considerable quantities of deals, boards, scantling, lath shingles, etc.

A survey was made at St. Alexis, during the autumn of 1882, by Mr. Josep Rosa, one of our engineers, in connection with a projected landing pier, which has been applied for, and is very much required for the shipping and the regular line of steamers carrying passengers, freight, and the mail up and down the Saguenay.

The projected pier, would be about 1,430 feet in length, to a depth of fifteen feet at low water. Its cost for a width of 32 feet, and a height of 41 feet at its outer end, estimated at \$50,000.

Ordinary spring tides rise about 18 feet.

Extreme " " 22 "

Ordinary neap tides " 11 "

8. *St. Alphonse.*

As it was originally named, and which has since been named Bagotville, is situated at the upper end or upon the west side of the Baie des Ha! Ha! and is upon the north side of the outlet of the Rivière à Mars.

	Statute Miles.
Distance from St. Alexis, northward, about.....	2.50
Distance by the main road leading north-westward to Chicoutimi, about	10.50
Ordinary spring tides rise about 18 feet.	

	Souls.
Population Village of Bagotville, per Census of 1881.....	508
" Parish St. Alphonse, " "	1,071
Total.....	1,579

The pier which was originally built at this place by the municipality towards 1860, was 445 feet in length, and 24 feet in width.

It was burnt by the great bush fires of April and May, 1870, and was afterwards constructed on trestles, for a length of 378 feet, down to the level of half tide.

In 1875, the Dominion Government having assumed the work, built a block of 32 by 26 feet on the south side, at the outer end of the pier.

In 1880-81, the burnt portion was re-built with solid crib-work, and in 1882, a block of 32 by 77 feet was added to the outer end of the pier. This portion is in process, and will be completed in 1883.

	Feet.
Depth of water at outer end of pier, as now constructed, during low water, of ordinary spring tides.....	29
Depth of water at outer end of pier, as now constructed, during high water, of ordinary spring tides.....	47
Length of pier to outer end inclusive, when completed.....	477
Width of pier for a length of 390 feet.....	24
Width of pier for a length of 87 feet, at the outer end, when completed.....	77
Height of pier at outer end	49
Top of pier above extreme high water.....	1

Pier is built in an easterly direction.

Total expenditure up to 1st July, 1882, by Dominion Government, \$9,186.63.

9. *Descente des Femmes, Anchorage on North Shore.*

	Nautical Miles.	Statute Miles.
Distance below Chicoutimi.....	21.73	= 25.00
Distance above Tadoussac.....	40.20	= 46.23
Width of the Saguenay.....	1.90	= 2.19

Depth of the Saguenay, at centre, 118 fathoms or 703 feet.

Depth from Cap à l'Est, downwards varies from 300 to 700 feet.

There is a cove at this place, 0.35 nautical or 0.40 statute miles in length, with depth of 20 fathoms at its entrance, decreasing to 5 fathoms near its head. Several vessels might lie moored in it with great security. There is a small rivulet at the head of this cove.

The Saguenay turns suddenly to the northward, between Cap à l'Est and Cap l'Ouest, at a distance of 5.80 nautical or 6.67 statute miles, but the westerly direction of the river from Tadoussac is continued beyond the point last named up to the head of the Baie des Ha! Ha!

Latitude of Descente des Femmes, per Bouchette..... 48° 22' 9"
Longitude " " " " 70 11 0

Ordinary spring tides rise 17 to 18 feet. Neap tides rise 10 to 11 feet.
The hills in rear of this cove consist of sienitic granite and gneiss.

10. *Le Tableau, on South Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	35.00	= 40.25
Width of the Saguenay.....	1.30	= 1.50
Depth of the Saguenay, at centre, 142 fathoms or 852 feet.		

11. *Trinity Point, on North Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	32.00	= 36.80
Width of the Saguenay.....	1.70	= 1.96
Depth of the Saguenay, 145 fathoms or 870 feet.		

12. *Cape Eternity, on South Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	28.50	= 32.78
Width of the Saguenay.....	0.90	= 1.04
Depth of the Saguenay, at centre, 146 fathoms or 876 feet.		
Hills, 1,500 feet in height of sienitic granite.		

13. *Cape Eternity Cove or Anchorage, on South Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	28.00	= 32.20
Width of the Saguenay.....	2.00	= 2.30

This is a large cove, half a nautical mile wide and a mile and a quarter deep with a river of the same name at its head.

At the head of this cove, vessels may lie securely, in from eight to thirty fathoms mud bottom, and as securely land-locked as if they were in a small lake surrounded with mountains.

14. *Anse St. Jean, Anchorage, on the South Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	21.80	= 25.07
Width of the Saguenay.....	2.50	= 2.88
Depth of the Saguenay, at centre, 118 fathoms or 708 feet.		

This is a large bay with a small islet off its north-west point. It is $1\frac{3}{4}$ nautical miles wide and $1\frac{1}{2}$ miles deep. The river St. Jean and several small streams enter at its head. Off these streams, and along the edge of the bank, which dries out a quarter of a mile from the shore, there is good anchorage for many vessels in from 40 fathoms, with a mud bottom.

A pier has been constructed on the south-east side of the cove, at about one mile from the outlet of the River St. Jean.

This pier, which was commenced by the Local Government of the Province of Quebec, in 1875, was completed by the Dominion Government in 1882.

Feet.

Pier is built in a northerly direction—length of pier to outer end	366
Width of pier for a length of 326 feet.....	26
Width of pier for a length of 40 feet, at outer end.....	50

The outer end projects 12 feet on either side, and is provided with steps for use during low tide.

Feet.

Height of pier, at outer end.....	28
Depth of water at outer end, during low water, spring tides...	$7\frac{1}{2}$
Depth of water at outer end, during low water, neap tides....	10
Rise of spring tides varies from.....	17 to 19
Rise of neap tides varies from.....	12 to 14
Top of pier above highest tides, about.....	$1\frac{1}{2}$

Anse St. Jean is provided with a church, saw-mill, school houses, and is well supplied for some distance back. Population, according to Census of 1881—653.

One of the steamers of the St. Lawrence Navigation Company calls here twice a week on its way up to Chicoutimi, and also on its downward trip to Tadoussac, since 1878.

Expenditure on pier in 1875, 1876, and 1877:—

By Local Government of Quebec.....	\$ 600 00
By municipality.....	600 00
By inhabitants and tourists.....	225 00
By Faustin Boivin, the foreman.....	130 00
By Price, Brothers & Co.....	145 00
	————\$1,700 00

Sums voted and expended by Dominion Government:—

In 1879-80.....	\$2,160 84
In 1880-81.....	1,500 07
In 1881-82.....	1,091 72
	————\$4,752 63

Total expenditure up to 1st July 1882..... \$6,452 63.

From Anse St. Jean there is a winter road to Malbaie, fifty-three miles in length; a road, at sixteen and a-quarter miles from Anse St. Jean, connects with the winter road, between Baie des Ha! Ha! and Malbaie; from the junction to Malbaie the remaining thirty-six and three-quarter miles are known as the "Chemin des Marais," four of which are in the Seigniory of Murray Bay; this section of thirty-six and three-quarter miles was opened by the Government in 1864, after a previous examination by the undersigned.

According to Charlevoix, and as shown on Sax's Map of 1827, there was a road, at the time of the French, from Anse St. Jean to Lake St. Charles, which is eleven miles to the north-westward from Dorchester Bridge at Quebec.

15. *River Petit Saguenay, on south shore.*

	Nautical miles.	Statute miles.
Distance above Tadoussac.....	18.50	= 21.28
Width of the Saguenay.....	1.30	= 1.50

Depth of the Saguenay, at centre, ninety-eight fathoms, or 588 feet.

16. *Ile St. Barthélemi, anchorage, near north shore.*

	Nautical miles.	Statute miles.
Distance above Tadoussac	16.50	= 18.98
Width of the Saguenay.....	1.20	= 1.38

Depth of the Saguenay, at centre, ninety fathoms, or 540 feet.
 Ile St. Barthélemi lies close to the mouth of the River Cacard. A vessel or two might be secured there; the place is small and the depth of the anchorage varies from six to twenty fathoms.

17. *Ile St. Louis, anchorage, one-third of a mile from South Shore.*

	Nautical Miles.	Statute Miles.
Distance at lower end from lower end of Island down to Tadoussac.....	14.90	= 17.14
Width of the Saguenay.....	1.30	= 1.50

Depth of the Saguenay, at centre, 39 fathoms or 234 feet.
 Ile St. Louis forms an excellent anchorage, either under its east end or between it and the south shore; the depth of water in this anchorage varies from 10 to 39 fathoms, and the bottom is of sand and mud.

18. *Rivière Ste. Marguerite, on the North Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac... ..	13.00	= 14.95
Width of the Saguenay.....	1.00	= 1.15

Depth of the Saguenay, at centre, seven fathoms or 42 feet.

19. *St. Etienne Bay and River, anchorage, on South-West Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac	9.00	= 10.35
Width of the Saguenay.....	1.15	= 1.32

Depth of the Saguenay, at centre, 50 fathoms or 300 feet.
 The Bay is a mile wide, and forms a harbour where a number of vessels, by riding in from 10 to 30 fathoms over a clay bottom, along the edge of the bank which dries out a third of a mile from the shore.

20. *Anse à la Barque, anchorage, on the North Shore.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	1.10	= 1.27
Width of the Saguenay.....	1.00	= 1.15

Depth of the Saguenay, at centre, 100 fathoms or 600 feet.
 The cove here is two-tenths of a mile deep. A vessel or two might be moored in it.

21. *Anse du Portage, on the South Shore, opposite Anse à l'Eau.*

A pier 108 feet long, 18 feet wide, 28 feet high at outer end, and a slip 104 feet long, 24 feet wide along the west side of the pier, were commenced in 1881 and completed in the autumn of 1882.

The depth of water at the outer end of the pier is 4 feet during low water spring tides, and 21 feet during ordinary high water spring tides.

The land mail from Quebec is conveyed from this point by small boats across the Saguenay to l'Anse à l'Eau, on the opposite or south shore.

The pier and slip were built for the special accommodation of the mail and passengers, particularly during the winter, and the time when the mail steamers do not run.

The expenditure upon this work, by the Dominion Government, up to 1st July, 1882, amounts to.....\$ 584⁴³/₁₀₀

The subsequent expenditure for its completion up to November, 1882, is..... 780 99

The total expenditure being.....\$1,365 42

	Feet.
Ordinary spring tides rise, per Bayfield.....	17
“ neap “ “ “	10

CABLE FOR TELEGRAPH LINE OF DOMINION GOVERNMENT ON NORTH SHORE OF THE ST. LAWRENCE, ACROSS THE SAGUENAY.

This cable was laid across the outlet of the Saguenay, a distance of about one statute mile, in 1881, from a point a short distance above l'Anse du Portage on the south shore, to l'Anse à l'Eau, near Tadoussac on the north shore, in order to connect the north shore line from Malbaie to the south shore of the Saguenay, with that from l'Anse à l'Eau and Tadoussac on the opposite shore down to Betsiamits (Bersimis), a total distance of 147½ miles. This line will probably be extended down to the Strait of Belle-Ile.

The Dominion Government Telegraph Line, along the north shore of the St. Lawrence, connects at Malbaie with the line of the Montreal or Great North Western Telegraph Company.

The date of construction and cost of the various sections are as follows, viz. :—

	LENGTH. Statute miles.	COST.
Malbaie to l'Anse du Portage on the south side of the River Saguenay, near outlet, commenced in 1880; completed 23rd July, 1881	44	\$5,466 91
Cable laid across the Saguenay, from l'Anse du Portage to l'Anse à l'Eau, near Tadoussac, on 21st November, 1881. Cable removed and a stronger cable laid in August, 1882.....	1¼	3,541 59
Anse à l'Eau to Sault au Mouton or Mille Vaches. Completed 7th November, 1881.	43¾	4,619 70
Sault au Mouton to Betsiamits (Bersimis). Completed September, 1882.....	58½	8,324 34
Total, exclusive of branch line.....	147½	\$21,952 54
Baie St. Paul to Chicoutimi branch line. Completed 1st September, 1881.....	92	12,481 07
Total, including branch line.....	239½	\$34,433 61

22. *L'Anse à l'Eau, on the North Shore of the Saguenay, opposite l'Anse du Portage.*

	Nautical Miles.	Statute Miles.
Distance above Tadoussac.....	0.50	— 0.58
Width of the Saguenay.....	0.80	= 0.92
Depth of the Saguenay, at centre, 88 fathoms, or 528 feet.		

Landing Wharf.

The landing wharf used by the steamers of the St. Lawrence Navigation Company, which call here four times a week from Quebec on their way up, and also on their way down the Saguenay, was built by the Messrs. Price.

These steamers call only twice a week, each trip, at Chicoutimi and Anse-à-Jean, and four times at St. Alphonse. Application has been made to the Dominion Government for the construction of a pier from the outer end of the wharf to deep water.

Dams at Fish Ponds.

Four dams were constructed by the Dominion Government at l'Anse à l'Eau at different altitudes above the River Saguenay, for a short distance inland, in connection with the salmon fish-hatching establishment at the upper end of the wharf, during 1881-82.

The dimensions of the dams may be stated as follows, viz:

No. 1—	47 feet long and 5 feet high, on an average.
No. 2—	214 “ 12 “ “
No. 3—	110 “ 19 “ “
No. 4—	64 “ 18 “ “

Total...435

Ponds Nos. 2, 3 and 4 were cleaned out at the bottom.

Total cost of work up to 1st July, 1882, \$4,046.46.

23. *Tadoussac Harbour.*

Tadoussac, in the language of the Montagnais Indians, signifies “Knobs” (Mamelons.)

It is about half a mile below l'Anse à l'Eau, and about one mile above the mouth of the Saguenay, and is situated upon its north-east side, at 61.93 nautical or 72.2 statute miles below Chicoutimi, or at 96.50 nautical, equal to 110.97 statute miles below the east end or outlet of Lake St. John, at the mouth of the Petite Décharge, the smallest of its two outlets into the River Saguenay.

The depth of water varies from 624 feet in the centre of the Saguenay to thirty feet and more in the harbour.

The harbour is at 48° 8' 32" of north latitude, and 69° 42' 49" of west longitude, according to the Admiralty sailing directions published in 1860.

It is one-third of a mile deep, and a little more than half a mile wide, and is sheltered by steep and rugged hills of granite, rising in the rear to a height of 400 feet.

According to the Admiralty charts, we find the following, viz:—

High water at full and change.....	2 h. 45 min.
Spring tides rise.....	17 feet.
Neap tides rise.....	10 feet.
The tide ebbs along the shore.....	6 h. 15 min.
The tide flows along the shore.....	6 h. 18 min.

Both streams run three-quarters of an hour after high and low water.

The depth of water in the harbour during low

water spring tides varies from..... 30 to 50 feet.

and during high water from 47 to 67 feet.

The anchorage for ocean vessels is in from six to 18 fathoms, on a clay bottom.

Tadoussac harbour is described as follows by Bayfield :—

"Tadoussac harbour is on the eastern side of the Saguenay, and a mile within Pointe aux Vaches. It is a bay between Rouge and Ilot Points, with a sandy beach at its head, and rather more than half a mile wide and a third of a mile deep."

"The anchorage is in from seven to eighteen fathoms, clay bottom. Vessels ought always to moor and have a heavy anchor close in shore, for the gusts from the north-west are at times exceedingly powerful, and should the anchor start there would be little chance of bringing up again before the vessel had dragged her anchor down hill into deep water. Besides, although vessels are here completely out of the regular streams of the tides, yet eddies often set into the bay, causing a vessel to winground several times in a tide, so that it would be almost impossible to keep a clear anchor."

"The shelter is rendered complete in every direction by either land or reefs, excepting for one point between south-east by south and south south-east, and there Red Islet, with the south coast beyond it at no great distance, prevents any sea of consequence, even to a boat, from entering the harbour."

The capaciousness of this harbour is variously represented, says Bouchette; some persons think that it could not contain more than five or six vessels, and even these could be under the necessity of carrying anchors ashore; others state that twenty-five ships of war can ride there in safety. Mr. Nixon, of the exploring party of 1828, says that not more than ten sails can ride in safety in the harbour. At low water a ship can be brought close in shore, for it descends at once.

The highest tides rise 21 feet perpendicular in five and a-half hours tide, according to Bouchette.

The beach, on which there are extensive salmon fisheries, extends out a considerable distance, materially contracting the dimensions of the harbour.

The harbour, however, is secure, and under shelter by the surrounding hills from most winds, except the southerly gales, which may affect vessels at flood tide, as the small White Island and Batture aux Alouettes are then covered by water, and which shelter them at ebb-tide.

The entrance of the channel to the harbour of Tadoussac or to the Saguenay, says Bouchette, is intricate at the ebbing tide and for vessels descending the St. Lawrence, which must come almost abreast of the lighthouse on Green Island, bearing south-east from the harbour, and then pass to the north of White Island at the extremity of the shoal or Batture aux Alouettes, and clear at the same time the shoal which sets out some distance from the north-east point of the harbour. It is far less intricate for vessels coming up from below.

The ice forms here much later than at Quebec, and disappears much earlier. This is occasioned by the extreme depth of the waters which are much more salt than to the southward, and by the prevalence of north-west winds in spring and fall, which drive to the southward all the broken ice which is formed at the mouth of the fresh water rivers.

According to recent observations the harbour of Tadoussac and the coast downward on the north shore is free from ice for a breadth varying from twelve to fifteen miles the most of the winter, except occasionally after one or two days of strong south wind, which occurs very seldom during that season.

Tadoussac was the principal missionary seat of the Jesuits below Quebec, from 1635 to 1782 inclusive; the first mission, it appears, was founded here by Jean Dequen, in 1635, twenty-seven years after Quebec was founded by Samuel de Champlain, under the French; the first resident missionary was Paul Le Jeune, in 1640, and the last, or twenty-third, was J. B. De La Brosse, from 12th July, 1766, to 1782,

inclusive. Prior to 1668 no less than 900 Indians came there during the summer exchange their furs with the traders and to attend the mission at the same time.

Arthur Buies, in his history of the Saguenay and Lake St. John, published at Quebec in 1880, and Bouchette, in his Topographical Dictionary of the Province of Lower Canada, published in 1832, give many interesting details of information respecting Tadoussac, the Lake St. John and Saguenay regions, of which a brief description is given in this memorandum.

André Michaux, the celebrated French naturalist, on his way from Quebec to the Hudson's Bay, stopped at Tadoussac towards the third week of July, 1792, examining the trees and plants of the locality, purchased two canoes and hired Indians before proceeding up the Saguenay. Tadoussac at that time was a pretty little village built on a point of rock at the junction of the Rivers St. Lawrence and Saguenay. Its small chapel, about 25 feet in length, was conspicuous amongst the other buildings by its red roof and its graceful spire.

The narrative of Michaux's journey from France to the United States, and thence to Quebec, Tadoussac, Lake St. John and Hudson's Bay, will be found in the pamphlet published by the Rev. Ovide Brunet, Professor of Botany at the University, in 1861, at Quebec.

Up to 1876 Tadoussac formed part of the Diocese of Quebec, since which time has been annexed to that of Chicoutimi.

Since the time of the French it has been, and is still, one of the principal trading posts for the fur trade with the Indians; these posts, called the "King's Posts," were leased to the Hudson's Bay Company in 1829.

Tadoussac, for many years, has been, and continues to be, one of the favourite summer resorts for tourists from the United States and Canada.

It is now an extensive village, with a population of 341 persons, according to the Census of 1881.

A survey was made at this locality by Thos. Breen, Provincial Land Surveyor, for the Dominion Government in 1882, in connection with a projected landing pier, which is very much required for the accommodation of the passenger, mail and freight steamers, which, up to the present time, have been obliged to call at l'Anse à l'Écluse, where they stop four times a week on their way up the Saguenay, and four times a week on their return trip to Quebec.

LIGHTHOUSES.

Entrance to Saguenay.

There is a pair of range lights which was formerly, but is now no longer, used for the guidance of vessels from the St. Lawrence into the mouth of the Saguenay. One of them is situated on an eminence about a quarter of a mile, and the other at Pointe Noire, in latitude $48^{\circ} 07' 21.5''$ per Capt. Deville, and six-tenths of a nautical mile south-eastward upon the south shore, below the pier at Anse du Portage, which is opposite l'Anse à l'Écluse.

The light now used is on the Pointe aux Alouettes, 1.70 nautical miles below Pointe Noire, on the south side of the mouth of the Saguenay at its junction with the St. Lawrence. The lighthouse here is a square wooden building painted white, situated at $48^{\circ} 5' 30''$ of latitude, and $69^{\circ} 40'$ of longitude. The light, which is a fixed one, is thirty-five feet above high water mark, and is visible ten miles in clear weather; it was built in 1848.

On the centre of Ile Rouge, 5.8 miles south-eastward from the light on Pointe aux Alouettes, there is a grey stone circular lighthouse in latitude $48^{\circ} 4' 20''$ and longitude $69^{\circ} 32' 56''$ with a fixed red light seventy-five feet above high water mark, visible twelve miles in clear weather; it was built in 1848.

There is also a light-ship moored in ten fathoms of water north-east from Ile Rouge, a little open to the north of Hare Island, with a red buoy lying about half a mile in a west-south-western direction.

A steam fog-whistle on the light-ship, sounds ten seconds in every minute.

This light ship is situated at $48^{\circ} 6' 30''$ of latitude, and $69^{\circ} 30' 20''$ of longitude ; it has two fixed white lights, one on the fore and the other on the main-mast, at 22 and 34 feet above high water.

The vessel is painted red, with the words: "Red Island Light-ship" on each side. It was first lighted in 1871.

(See list of lights published by Department of Marine and Fisheries, in 1881.)

The Dominion Government works on the Saguenay, between Lake St. John and Tadoussac, since 1867, may be briefly enumerated as follows:—

1. The partial renewal of the dams and slide on the Petite Décharge. Work now in progress.
2. The widening of one of the narrowest portions of the Grande Décharge, about 1.15 miles below the foot of Lake St. John. Work now in progress.
3. The improvement and extension of the pier at Chicoutimi, together with the construction of a storehouse on the pier. Work completed.
4. The deepening, widening and straightening of the ship channel, between Chicoutimi and Pointe aux Roches. Another year required for completion.
5. The reconstruction and extension of the burnt pier at St. Alphonse de Bagotville. Work will be completed in 1883.
6. The extension and completion of the pier at l'Anse St. Jean. Storehouse required.

7. The construction of a small pier and landing slip at l'Anse du Portage, for the accommodation of the ferry row-boat and passengers, across the outlet of the Saguenay to l'Anse à l'Eau, specially during the winter, spring and fall of the year, when the steamers do not run.

8. The reconstruction of three old dams and the construction of one new dam in connection with the reservoirs or ponds for the propagation of salmon at l'Anse à l'Eau near Tadoussac.

Prior to 1879 the repairs to the dams and slide on the Petite Décharge, were made under the late slide master, Damase Boulanger who died in 1881.

The original pier at Chicoutimi was built in 1873-74 under Hypolite Dufour by the St. Lawrence Tow Boat Company.

The reconstruction of the pier at St. Alphonse and the extension of the pier at l'Anse St. Jean were under the charge of Simon Cimon, one of the Government Engineers in 1880.

The remainder of the works since 1878 have been and are still under the charge of Joseph Rosa, the engineer who has also charge of the breakwaters at Carleton and New Carlisle on the Baie des Chaleurs and at Etang du Nord, on the Magdalen Islands, and has successfully conducted works for the Department of Public Works during the past thirty years.

For details respecting Saguenay slide, piers and dams, see Jos. Rosa's Report No. 0,975 of 15th January, 1883.

CLIMATE OF THE SAGUENAY BETWEEN TADOUSSAC AND LAKE ST. JOHN.

The climate of the Saguenay is good and similar to, if not better than that of Quebec, although the autumnal frosts are felt there earlier; it is however inferior to that of Lake St. John where the frost is said to commence from fifteen to twenty days later.

At Chicoutimi the land is fit for tillage in May, and strawberries have been eaten there on the 17th of June.

(For Further details, see Topographical Dictionary, Bouchette.)

SOIL ALONG THE SAGUENAY

From Tadoussac up to the Baie des Ha! Ha! a continuous chain of high mountains incloses the river on both sides.

The north shore of the Saguenay affords but little land for culture up to Pointe aux Roches; thence to Terres Rompues, the shore declines in height, the land become level and are of the best quality. The lands in the rear are nearly level for eighteen miles. From Terres Rompues up to Lake St. John, the land is level and of the best quality. The north shore of Lake St. John, as before stated, presents vast tracts of level land of the best quality, which has not yet been settled for the want of roads.

The south shore of the Saguenay is better than the north shore for agricultural purposes. From Trinity Bay to Baie des Ha! Ha! the hills are abrupt and barren but from Baie des Ha! Ha! to Chicoutimi and up to Lake St. John, there are extensive tracts of excellent land, the most of which is settled.

Lake St. John, as before stated, comprises a large extent of excellent land which is settled along the south shore up to its westerly end at the mouth of the Mistassini.

At the rear of the mountains which border the south shore of the Saguenay, there are extensive tracts of excellent land fit for settlement, watered by no less than twenty lakes, each side of the winter road, between the Baie des Ha! Ha! and Lake Nairn, for two-thirds of the entire distance of sixty-three miles. Lake Nairn is some nine miles in the rear of Malbaie. The writer of this memorandum has travelled over this country on foot, six times, from 1855 to 1867.

Forests, on the borders of the Saguenay, etc.

On the north shore of the Saguenay most of the forest was destroyed by fire towards 1782.

The timber on the north shore up to Pointe aux Roches, and on the south shore up to the Baie des Ha! Ha! consists chiefly of small, stunted red pine, growing here and there.

At Baie des Ha! Ha!, up to the time of the last destructive fire in 1870, it consisted of maple, cherry, ash, elm, poplar, pine, spruce, etc.

Timber has always been scarce in the neighbourhood of Chicoutimi although the soil is marly along the shore.

For six miles above Chicoutimi the timber is cedar, spruce, fir, pine, ash, black birch and elm, growing on a clayey and loamy soil.

Along the line of the winter road which was first laid out in 1847, by James Stewart, one of the Engineers of the Public Works Department, and was afterwards partly constructed in 1856 by the same Department, between St. Alexis de la Grande Baie and Lake Nairn, the country for fully two thirds of the distance, or for about 40 miles, was covered with a luxuriant growth of timber of the various descriptions which were formerly found around the Baie des Ha! Ha! previous to the destructive fire of 1870.

The settlement of this part of the country, like many others in the region just described, has been greatly retarded owing to the want of proper roads.

WILD ANIMALS.

River Saguenay Region.

The beaver, moose-deer, white fox, hares and porcupine are occasionally found but they are becoming scarcer every year.

The otter, marten and mink which were formerly numerous, are as rare as the other animals.

BIRDS.

River Saguenay Region.

Water-fowls of various descriptions are numerous, and white partridges, "ptarmigans," which change their colour like the hare, and the ordinary partridge

and other birds, are found on the hills and in the neighbourhood of the small lakes in their rear, on each side of the River Saguenay, and especially on its south-west side.

FISH.

River Saguenay.

The fish found in the Saguenay are the gibard, porpoise, sturgeon, seal, salmon, salmon-trout, pike (brochet), pickerel, trout, cod, several kinds of herring, smelt, etc.

The gibard, or bottle-nosed whale, of a small size, never ascends above Cap à l'Est; it generally swims within a few rods of the port of Tadoussac.

Porpoises frequently ascend the river up to Pointe aux Roches.

The seal was still frequently seen up to 1832, but has almost disappeared at the present time.

The codfish, once so common, is seldom caught, and only in the neighbourhood of Tadoussac.

TRIBUTARIES OF THE RIVER SAGUENAY.

These are very numerous. On the following statement I have given the names of what are considered the most important, together with the distance from the mouth of each tributary down to Tadoussac.

There are thirteen on the north side and eight on the south side, besides others not enumerated.

From Lake St. John to Tadoussac, according to Admiralty Chart corrected to 1871, and map of Crown Lands Department, published at Quebec in June, 1880.

On the North side.

Names of principal Tributaries of the River Saguenay.	Distance from Tadoussac.	
	Nautical Miles.	Statute Miles.
Rivière Gervais.....	82.58	= 94.97
" Duclos	76.50	= 87.97
" des Aulnaies.....	73.02	= 83.97
" Shipshaw.....	68.02	= 78.22
" des Vases.....	67.15	= 77.22
" Au Caribou (marked "Valin" on Ad- miralty Chart).....	58.30	= 67.05
" Valin (marked "Caribou" on Admir- alty Chart).....	57.80	= 66.47
" à la Loutre.....	58.67	= 67.47
" Aux Outardes.....	56.30	= 64.75
" Aux Foins, above "Ste. Fulgence".....	55.43	= 63.75
" Du Moulin, below ".....	54.13	= 62.25
" A Pelletier.....	48.70	= 56.00
" Ste. Marguerite.....	13.00	= 14.95

On the South side.

Rivière Aux Sables.....	69.76	= 80.22
" Chicoutimi.....	62.80	= 72.22
" Du Moulin.....	61.30	= 70.50
" A Mars, north side of Grande Baie.....	52.40	= 60.26
" De la Grande Baie, south side.....	52.00	= 59.80
" Eternité.....	28.00	= 32.20
" Du Portage ou St. Jean (Anse St. Jean). ..	21.90	= 25.19
" Petit Saguenay.....	18.50	= 21.28

In connection with the foregoing respecting the Lake St. John and Saguenay Regions, I have appended the following memoranda, extracts, notes, lists of distances, population, shipping, etc., etc., viz:

- A. A memorandum on the navigation of Hudson's Bay, according to Professor Macoun's recent work on Manitoba and the Great North-West, also extracts of the *Montreal Gazette* and *Edmonton Bulletin* respecting the navigation and improvement of the Saskatchewan.
- B. A statement of the dates of opening and closing of the navigation at York Factory on Hudson's Bay from 1828 to 1880 inclusive.
- C. A lecture by Dr. John Rae in 1882 on the Arctic Regions and Hudson's Bay route.
- D. 1.—Notes respecting the Lease by the Crown of France to "La Compagnie des Postes du Roi" and by the Crown of England to the Hudson's Bay Company.
- D. 2.—Grant of North-West Territory by Crown of England.
- E. Extracts from Journal of Joseph Laurent Normandin in 1732, respecting his exploration of the Saguenay and Lake St. John regions.
- F. 1.—Note respecting the journey of André Michaux up the River Saguenay, Lake St. John and the River Mistassini to the Great Lake Mistassini and thence down the River Rupert to James' Bay on the Hudson's Bay, in 1792.
- F. 2.—Memorandum from Paschal Taché in 1823 respecting the River Saguenay and Lake St. John regions, etc.
- G. 1.—Extracts from Geological Report of James Richardson dated 31st December, 1857, on his exploration of the River Saguenay, Lake St. John and its tributaries.
- G. 2.—Extracts from Geological Report of Robert Bell, dated 1st March, 1858, on specimens of recent shells collected by him; also respecting climate, soil and timber, in country around Lake St. John.
- H. Extract from Report of the Geological Survey of Canada from its commencement to 1863, describing the geological features of the Lake St. John region.
- I. Tables of Distances along North Shore Telegraph Lines—Baie St. Paul Branch to Chicoutimi, and Malbaie to Betsiamits, (Bersimis.)
- J. 1.—J. 2.—Two tables showing the cost of construction of the North Shore Telegraph Lines from Baie St. Paul to Chicoutimi and from Malbaie (Murray Bay) down to Betsiamits.
- K.—Land route. Distances around Lake St. John.
- L.—Land route. Distances from head of Lake St. John down to Baie des Ha Ha!
- M.—River route from Tadoussac, at the mouth of the River Saguenay, up to the head of Lake St. John.
- N.—Population of the County of Chicoutimi, from Lake St. John inclusive to Tadoussac.
- O.—Number of trips of Steamers on the River Saguenay from 1872 to 1879 inclusive.
- P.—Number, tonnage and crews of Schooners in the Counties of Saguenay, Chicoutimi, and Charlevoix, from 1876 to 1882 inclusive.
- Q.—Number, tonnage and crews of sea-going vessels frequenting the north shore of the St. Lawrence from Betsiamits up to Tadoussac, and thence up the River Saguenay to Chicoutimi, from 1852 to 1882 inclusive.
- R.—Latitudes of certain localities and magnetic variations observed near Lake St. John and the River Saguenay.
- S.—Hon. D. E. Price and Rev. J. B. Vallée, respecting depth of Lake St. John. The whole respectfully submitted.

G. F. BAILLAIRGÉ,
Deputy Minister of Public Works.

OTTAWA, 1st February, 1883.

N. B.—Notes P, Q, R, S received after memorandum was written.

APPENDIX No. 8.

PART III.

LAKE ST. JOHN, RIVER SAGUENAY
— AND —
HUDSON'S BAY.
NOTES, ETC., A. TO S.

Note A.

HUDSON'S BAY.

The following remarks, respecting Hudson's Bay, have been extracted from Professor Macoun's recent work on Manitoba, published at Guelph, Ontario, in 1882.

THE CHARACTER OF THE NAVIGATION IN THE HUDSON'S STRAITS.

In 1814 Lieutenant Edward Chappell, R. N., of H. M. S. "Rosamond," visited Hudson's Bay, and in the narrative of his voyage, published in 1817, he pointedly adverts to the advisability of merchants sending a strongly-built brig into Hudson's Straits early in the month of June, so as to reach Cape Saddleback before the Company's ships arrive, with a view to trade with the Esquimaux of those coasts.

He also states that a vessel intended for this trade should not remain later than the beginning of October in the Straits. The period included between "early in June" and the "beginning of October," within the limits of Hudson's Straits sufficiently establishes the fact that, in the opinion of Lieutenant Chappell, as derived from practical observation on the "Rosamond," and a careful study of the subject, the navigation of the Straits is safe for a strong brig for a period of about four months or during June, July, August and September—say from the 10th June to the 5th October, or four lunar months. If for a "strong brig" we substituted a strong steamer, and fit her with modern and really inexpensive magneto-electric lights for night work, the difficulties Lieutenant Chappell encountered would be vastly diminished, and very probably an additional ten days added thereby to the season for navigation in October, making the period exceed four calendar months, for Lieutenant Chappell states that "it is not to be expected that ships," during their return to Europe from Hudson's Bay, will ever meet with loose ice; that is, with floe or pan ice. He is writing of the Hudson's Bays Company's ships, which are stated to start from York Factory homewards by the 20th of September, and so exact is he in his statements that ice is not to be expected to be met with by sailing vessels on their homeward voyage, that he enumerates the different kinds of work done on arrival at York Factory, close to Port Nelson, in the following words:—

"It is not to be expected that ships, during their return to Europe, will ever meet with loose ice; therefore, as soon as our ship anchored on York Flats, we undid all the preparations which had been made for manœuvring whilst amongst the ice, such as re-stowing our anchors and putting below ice-ropes, ice-anchors, ice-axes, etc. and we rejoiced in being rid of them."

This is a most important consideration in relation to the navigation of the Hudson's Straits in the fall of the year. In fact, it reduces ice precautions to the early summer voyages only, and besides conferring unexpected safety upon the homeward voyage, it prolongs the season of navigation, so that steamers may remain at York Factory or Port Nelson, until the ice begins to be formed about the harbor or mouth of Nelson River. The use of the magneto-electric light, on approaching either entrance to the Straits, or the establishment of land signal stations there, provided with powerful magneto-electric lights, would greatly assist in promoting safe and speedy navigation during the long nights of the fall of the year. In June and part of July, there is little or no night.

Once within the eastern entrance, the straits are seen to expand into a broad open Bay, well-known as Ungava Bay. Green Island lies about half-way between the north or Terra Nivea shore and Akpatok Island, at the entrance to Ungava Bay. The clear sea-way on either side of Green Island, being about fifty miles in width

In traversing the Straits, Ellis says:—"If I have to give any directions for avoiding the thickest of the ice in these Straits, it would be to keep pretty near the North Shore, for we always observed that side much the clearest, as not only the winds blow mostly from thence, but currents too come out of most of those large openings which are on that side. * * * * *

THE ICE OF HUDSON'S BAY AND STRAITS, AND ON THE LABRADOR.

The extent to which ice forms in Hudson's Bay is not known, but judging from the statements of Hearne whose opportunities (at the Prince of Wales Fort, near the mouth of Churchill River) for acquiring information were excellent, ten miles from the shore may be the extreme limit in the deeper and north-westerly portions. The southern part of the bay, and the eastern portion, probably freeze over a much larger area than the north-west portion, where the water is not only deep, but there are excellent reasons for supposing that a warm under-current comes to the surface there, forming a polynia, as in some parts of the extreme north, such as at the entrance to Smith's Sound, also in Bellot's Straits, in the Spitzbergen Seas, and on the west coast of Behring's Straits. The cause of these polynias will be found in any of the recent Arctic explorations by sea.

Hearne states that in the northern part of Hudson's Bay and Straits, "The sea is frozen over several miles from the shore." * * * * *

The objective point in Hudson's Straits, it is desirable to attain at the earliest possible date in the summer, is North Bluff, in the rear of the Upper Savage Islands, from which place, as already stated, the Hudson's Bay Company's ships generally take their departure across the Straits into Hudson's Bay. Baffin anchored here, in 1615. On Parry's chart, the Savage Islands are represented as a small group, eleven in number, protecting the entrance to North Bay, a deep opening in their rear. In his work is a sketch of the largest island, which he examined and described in 1821. The cliffs of the eastern island rise between 400 and 500 feet above the sea, and the highest portion to which Parry ascended is from 600 to 800 feet above the ocean; hence the group is a conspicuous object, and affords anchorage ground. Here Parry took his observations on the tides, which showed them to rise, neaps about 30 feet, as stated elsewhere. North Bay, in the rear, was entirely free from ice.

The great rise and fall of the tides in such a narrow strait gives color to the statement that ice never forms entirely across it, for it is well known that no agent is so powerful in preventing the formation of ice in northern latitudes as strong and continued tidal currents. * * * * *

DANGER ARISING FROM ICE.

Sir Edward Parry states that "the effects to be apprehended from exposure to the swell of the main ocean constitute the peculiar danger of first entering the ice about the mouth of the Hudson's Straits, which is completely open to the whole Atlantic. A very considerable quantity of loose ice is sufficient to shelter a ship from the sea, provided it be closely packed; but when the masses are separated by wind and tide, so as to admit the swell, the concussions soon become too violent for a ship, strengthened in the ordinary way, to withstand for any length of time. On this account it is prudent not to enter the ice without a fair prospect of getting seven or eight leagues within the margin. For the same reason, also, when likely to be beset near the sea, it is better to make a ship fast to small rather than to large pieces, in order to avoid the heavier concussions occasioned by the latter.

The Newfoundland, the Dundee, and the Norwegian sealing steamers being properly protected, push their way into the apparently illimitable fields of ice in March and April in pursuit of seals, seeking the ice, for it is there only that they can capture the seals. There are now five and twenty sealing steamers of large size in Newfoundland waters, and during the past ten years they have nearly driven the sailing sealing craft from this, formerly-styled, hazardous enterprise. It is not

unreasonable to suppose that at the present day, when ice navigation is so thoroughly understood, not only by the captains of sealing vessels, but by steam whalers, the passage through Hudson's Straits, successfully accomplished for 200 years by bulky and unwieldy sailing vessels and vessels of war, should now become an easy problem. Two, and often three, Hudson's Bay ships have for a period of nearly two centuries annually passed through Hudson's Straits and Bay, and for a considerable part of the time they were conveyed by the cumbrous men-of-war of olden times. Numerous whaling vessels have also traversed these waters, and it is announced that this year an American house is about to send again a whaler to that well known ground north of Churchill, Marble Island, and the coast towards Rowo's Welcome, to seek for the reputed remains of Sir John Franklin. The French not unfrequently sent vessels of war into Hudson's Bay, and once they destroyed the forts. All these facts show that old-fashioned sailing craft successfully accomplished for nearly two centuries, for the purposes of a limited trade, a supposed obstructed and hazardous navigation which the interests of a country as large as the empire of Germany now invite us to encounter with the modern protected steamer, the magnetso-electric light, and the experience of trained and skilled men. * * * * *

NAVIGABLE WATERS—Manitoba and North-West Territories.

Names of Rivers and Lakes.	Length.	Mean Width.	Mean Depth.	Remarks.
	Miles.	Feet.	Feet.	
Lake Winnipeg.....	300	The "Anson Northrup," the first steamer, commenced running in 1859.
Lakes Manitoba and Winnipegosis.....	230	.....	.....
Red River (within Manitoba).....	90	.....	.....
Assiniboine River.....	350	150	4	
Souris River (Probable).....	120	100 to 135	2 to 3½	
Qu'Appelle River and Lakes.....	200	70 to 100	2 to 4½	See next sheet. The "Lily," an iron steam boat, belonging to the Hudson Bay Company has been running on this river during the five past years.
Long Lake.....	40	.....	.....
Main Saskatchewan.....	400	.....	.....
North do.....	800	.....	.....
South do.....	1,000	750 to 2000	5 to 8	
Athabasca River and Lake.....	500	900	
Peace River.....	700	.....	.....
Mackenzie River and Slave Lake.....	1,500	1200 to 3000	20 to 300	
Little Slave Lake.....	75	

THE GREAT SASKATCHEWAN.

We copy from the *Edmonton Bulletin* of the 6th January, 1883, some extracts from an article on the improvements required on the North Saskatchewan River with the view of increasing the facilities of navigation. The subject is one of very great importance, and we commend it to the attention of the Government. Facilities of navigation between Edmonton and Grand Rapids, and thence through Lake Winnipeg and up the Red River to the great distributing point, Winnipeg, are important factors in the settlement of the Great North-West. Our correspondent who visited the North-West about three years ago, devoted one of his letters to this subject, and the suggestions then made, were substantially the same as those now made by the *Bulletin*. It was then pointed out, that for a sum of not more than \$50,000, this long stretch of navigation, draining a most important section of the North-West, could be

greatly improved. Some of the suggestions have since in part been acted upon, such as that relating to the lighting of Lake Winnipeg, although something remains to be done in that direction.

The bar at the mouth of the Red River, it was pointed out, required dredging, and lights at that and one or two other points on the lake, were necessary to make the navigation of it safe.

The lights at the bar, have, we believe, been placed; and in this respect, a decided improvement has been effected. On the Saskatchewan, there were some places mentioned, at which improvements were required, namely at Rocher Rouge, a long swift rapid, where the steamer has now to be assisted with ropes; at the Demi-charge Rapids, a heavy piece of water, which it often takes the steamer a full day to ascend, the rope used being a mile and a quarter in length, having to be carried across a lake at the head of the rapids, and fastened to the trees on the opposite shore; at the Narrows, where a large boulder in the very centre of the channel should be removed; at Tobin's Rapid, a long shallow rapid which it sometimes takes two days for the steamer to ascend, a difficulty which could be overcome by the removal of some rocks and the construction of a couple of wing dams; at the Nepowin Rapids, where some rocks require to be taken out in two places; at the Little Rapids, where similar improvements are required, and at Cole's Falls, which is perhaps the worst part of the river east of Prince Albert, and where several rocks will require to be removed, and wing walls constructed.

It is difficult to over-estimate the importance of these improvements. The Saskatchewan, if placed in a condition for safe and moderately rapid navigation, will always form an important means of transportation for the northern part of the great fertile belt, and must therefore have a valuable influence in regulating freight by railway as well as water. The outlay required is happily not great. The improvements we have indicated are all that are necessary to make the navigation suitable and the material for the improvement being near at hand will prove a great advantage. We join with our enterprising western contemporary in urging upon the Government that this subject be taken up without delay. In no way can a portion of the surplus, to which north-western development has so largely both directly and indirectly contributed, be better expended. For a long time to come, even with the rapid progress of railway construction, a very considerable part of the territory in the North-West must be largely dependent upon the water route by the great Saskatchewan. But, even after the railway reaches the river, the improvements named will still be hardly less valuable. The boats will then run to and from places where the river is tapped by the railway, and will still more rapidly and cheaply accommodate the country. In fact, from every point of view, whether we have regard to the present isolation from railway communication of the northern part of the fertile belt, or to the future when the great Saskatchewan will be tapped or crossed by railways, the importance of these works can hardly be over-estimated.

IMPROVING THE RIVER.

[From the *Edmonton Bulletin*, January 6, 1883.]

The season available for navigation on the North Saskatchewan is short, and anything that can be done to increase the length of the navigation season, or to increase the capacity of the river during navigation will be a benefit not only at present but for the future.

The Saskatchewan, running as it does from west to east and emptying into Lake Winnipeg, thereby connecting by navigable water with the railway systems centering in Winnipeg City, and also in future by a very short line of railway, with ocean navigation on Hudson's Bay, running through a good farming country for the greater part of its course, having on its upper part coal and timber which will be required by the purely agricultural country which it passes through farther down, this river is certain to be of the greatest use in the development of the country and the carry-

ing on of its trade for all time. In this country where railway monopolies will hold sway for many years, this river, capable of doing the trade that would otherwise render the building of a railroad necessary, will forever act as a bar to monopoly of all kinds, as it will never be possible, unless the direction of the current can be changed, to altogether monopolize the navigation of it. As long as the river runs eastward, settlements along its banks will have an outlet for their surplus products at lower rates than places, which have railway communication alone, can ever hope to receive the benefit of.

From Edmonton to Frog Creek, the river is a large, swift stream reasonably straight, with deep water, except at the many rapids along its course. These rapids are merely shallow places where the current is very swift and the bottom is strewn with large and small boulders. The rapids do not appear in very high water. They only impede navigation in low water, and then not by the too great swiftness of the current, as the boats steam up them without difficulty, but by the deep channel being obstructed by large boulders. In few, if any of them, is there no channel deep enough to let a boat pass, even in the lowest stages of water, if cleared of boulders. This part of the river is the best for navigation in high water, and if a channel were cleared in each of the rapids, by taking out the boulders in some and perhaps deepening in a few others, there is no doubt that in low water also it would be the best. Between the rapids in low water there is very little current, and the navigation is first-class.

From Frog Creek to Prince Albert the river runs in a very wide bed, the country is mostly open plain, and the banks are not so high as in the upper part of the river. In high water this part has a fine appearance, as the stream is upwards of a quarter of a mile wide, with a good current; but in low water the current is sluggish, and the stream winds from side to side of its bed, which is much too large for it, amongst sand-bars and islands, making the navigation very difficult, but not at all dangerous. There is supposed to be always a deep channel somewhere in the width of the stream, but the difficulty is to find it, and the searching for it, or the sticking by not finding it, causes delay. This, however, is unavoidable at present, as it would be almost or altogether impossible to make or keep any certain channel in the shifting sand. It will be time enough to consider the improvement of this part of the river when the rapids above and below have been attended to, as now they, and not the sand-bars, are what actually stops navigation in low water. Although the navigation amongst the sand-bars is never good, it has never been actually stopped by them so far.

From Prince Albert down, the rapids are on a larger scale than those in the upper part of the river, but by taking out the boulders, they can be made passable in all stages of water. Indeed, the boulders would be taken out, except in Cole's Falls, more as a precaution against accident than to simply deepen the channel, as the river is much deeper and larger there than in the upper part of its course.

The improvement of the navigation of the Saskatchewan is a work which is within the duty of the General Government, and should claim their attention second to no other work in the country. A dollar properly spent on this work would be of more real benefit to the country than five dollars spent in any other way. and it is only fair, that when such a considerable revenue is being derived from the sale of land along its banks, that a portion of the money should be applied to the improvement of the river. Such action would also be good policy, as it would enhance the value of the land remaining unsold along its course.

It is estimated that expenses in the removal of boulders to the amount of \$15,000 or \$20,000 would be sufficient to improve the channel so as to allow the boats to make one more trip, from Grand Rapids to Edmonton each season, than they can at present, and to take 100 tons more freight on each trip. There are now four boats, carrying 200 tons each, on the river, and allowing that each boat can at present make three full trips, which they certainly can, in a favorable season, this estimate would allow an increase of freight to the amount of 2,000 tons, or 40,000 pounds per season, and if this increase in business could be made, the boats would be able to lower their rates

accordingly, which would be a direct benefit to the settlement along the whole course of and tributary to the river. This is a matter in which all in these settlements are deeply interested and which cannot be pressed too strongly upon the consideration of the Government.

See *Montreal Gazette*, 14th February, 1883:

NAVIGATION OF HUDSON'S BAY.

House of Commons, Ottawa, 22nd February, 1883.

Mr. Dawson moved for information obtained through reports from officers of the Government, correspondence with the Imperial authorities, or otherwise, in reference to the duration of the season of navigation at Hudson's Bay. He pointed out that this subject was especially important now, as numerous railways were being projected to that great sea, the Mediterranean of America.

Mr. Royal expressed the opinion that a new Maritime Province would be created in the neighbourhood of Hudson's Bay. The establishment of the practicability of a route to Europe by the Hudson's Bay would place the farming lands of the North-West in a position as advantageous as that now occupied by the lands west of Toronto. A direct route from Europe to the North-West would prevent the sifting of our immigrants, which now, to a certain extent, took place in their passage through the United States.

Sir John Macdonald said there was in the future a great prospect of prosperity in the mineral lands surrounding the Hudson's Bay. There were now three railways projected and authorized by this Parliament—two to Hudson's Bay and one to James' Bay. There was unofficial communication going on between Sir Alexander Galt and the Admiralty to ascertain whether the Imperial Government would enter into a joint arrangement with Canada for the survey of Hudson's Bay and the Straits, placing there a vessel fitted for Arctic seas, for the purpose of ascertaining beyond a doubt the length of time, every season, during which the bay and the straits were open to navigation. There was some reason to believe that it was probable that Her Majesty's Government would be prepared to aid in the matter, either by furnishing the vessel or by contributing to the expense of such a survey.

The motion was carried.

Note B.

No. 30,847.

METEOROLOGICAL OFFICE,
TORONTO, CANADA, 9th January, 1883.

SIR,—I beg to enclose herewith a copy of Mr. Woods' Report, of York Factory, on the opening and closing of navigation at that port, as requested in your letter of the 4th instant.

I have the honour to be, Sir,

Your obedient servant,

CHARLES CARPMAEL,

Superintendent.

F. H. ENNIS, Esq., Secretary,
Department of Public Works,
Ottawa.

SUMMARY of the opening and closing of Hayes River, opposite York Factory, from the Year 1828 to 1880, a period of 52 Years, according to report of Mr. Wood, of York Factory.

Year.	Date of Opening.		Date of Closing.		Remarks.
1828.....	June	1	November	15	Geese seen 29th April.
1829.....	May	10	do	11	
1830.....	do	17	December	2	
1831.....	do	22	November	28	
1832.....	do	25	do	26	
1833.....	do	13	do	22	
1834.....	do	27	do	20	
1835.....	do	24	do	18	
1836.....	do	16	do	29	
1837.....	do	11	do	25	do 26th do
1838.....	do	23	do	22	do 30th do
1839.....	do	22	do	19	do 3rd May.
1840.....	do	12	do	16	do 1st do
1841.....	do	10	do	13	do 26th April.
1842.....	do	17	do	11	do 22nd do
1843.....	do	29	do	16	do 5th May.
1844.....	do	13 to 20	do	26	do 21st April.
1845.....	do	22	do	24	The opening of the river this year is rather doubtful, some say 9th.
1846.....	do	7 or 9	do	25	
1847.....	do	9	do	15	
1848.....	do	21	do	28	
1849.....	do	18 to 24	do	27	
1850.....	do	31	do	28	
1851.....	do	31	December	9	
1852.....	do	16	November	8	
1853.....	do	26 to 30	do	9	
1854.....	do	23	do	16	* Rather doubtful if it was not the 25th.
1855.....	do	21 to 24	do	24	
1856.....	do	20 to 22	do	19	
1857.....	do	14 to 19	do	17	
1858.....	do	24	do	24	
1859.....	do	13	do	16	
1860.....	do	18	do	19	
1861.....	do	22 to 28	do	16	
1862.....	do	24 to 29	do	24	
1863.....	do	22	do	30	
1864.....	do	19	do	26	
1865.....	do	16	do	20	
1866.....	do	14	do	28	
1867.....	do	23 to 28	do	24	
1868.....	do	24 to 31	do	29	
1869.....	do	25	do	6	
1870.....	do	11	do	27	
1871.....	do	12	do	23	
1872.....	do	16	do	20	
1873.....	do	14	do	18	
1874.....	do	16	do	20	
1875.....	do	19	do	15	
1876.....	do	10	do	24	
1877.....	do	20	do	15 to 20	
1878.....	do	15	do	3	
1879.....	do	11	do	23	
1880.....	do	26	do	20	

(Signed) WM. WOODS.

True copy.)

CHARLES CARPMEAL,
Supt. of Meteorological Service.

Note C.

THE ARCTIC REGIONS AND HUDSON'S BAY ROUTE.

REPORT OF A LECTURE BY DR. JOHN RAE.

Manitoba Historical and Scientific Society, Winnipeg.

1882.

Dr. John Rae the celebrated Arctic Explorer, lectured on Saturday evening to a large audience, in Westley Hall, for the benefit of the Historical and Scientific Society of Manitoba.

The chair was taken by the President of the Society, Mr. Alexander McArthur who, in introducing the lecturer, announced that he had very kindly allowed the proceeds of the lecture to go to the funds of the Society, and that it was intended to devote them to the formation of a nucleus of a library of Arctic travels and research under the care of the Society.

Dr. Rae prefaced his lecture with the observation that having passed the last week in travelling, he consequently had not had time to look up the subject, and as he had no notes, he therefore craved the indulgence of his audience. The subject of Arctic exploration, he said was a large one, and he might go over the discoveries and researches of other people; but he rather thought that his hearers would like to have some of his own experience, (applause) not that he regarded his own as of greater importance than that of others, but it was always pleasanter to hear a man speak of what he had done himself, as he could speak with confidence of it. His first object in going to the Arctic regions was to trace out a large bay (north-west of Hudson Bay) which he pointed out on a map kindly furnished for the occasion by Mr. R. I. Richardson. The bay was upwards of seven hundred miles around, and three or four Government expeditions, commanded by some of the most experienced Arctic navigators of England had attempted the survey of the coast. Parry, Sir George Back, Captain Lyons and Sir John Ross had attempted to push through, but failed. The lecturer showed the points reached by these, also a gap which had still been left unsurveyed. In 1845, the Government having given up the search, after a cost to the country of £70,000 or £80,000, Sir George Simpson, Governor of the H. B. Company asked for the lecturer to undertake it, and for the purpose offered him a nice little schooner; but, as ships had hitherto failed, he had preferred to take two small boats and three or four months provisions. He found difficulty in getting men on account of the small stock of provisions and the prevalent idea that fuel should be carried along. Nearly all of his men were engaged at Winnipeg, (Fort Garry) and consisted of Scotchmen, Orcadians, one or two pure Indians and some splendid half-breed. Hector McKenzie, who was still in the settlement, accompanied him on one of his voyages. A better set of men never went to perform any duties. His two little boats were built at York Factory, and as soon as the ice broke up at the end of June they started and sailed along the western coast of Hudson's Bay for nine hundred miles in these little open boats with no deck or other covering except a piece of oil-cloth. They lived almost entirely on ducks and seals, keeping their pemmican for future use. Immense quantities of ice were encountered along Repulse Bay, early in August. Taking one of the boats across the land, and finding the bay so full of ice that even their small boats could not get along they decided to winter. The party numbered fifteen altogether, including two Esquimaux as interpreters. There was very little sign of living creatures; they obtained scarcely enough venison to keep them, and were obliged to consume a considerable part of their pemmican. Observing, how

ever, the tracks of reindeer which had passed up north in the spring, he came to the conclusion that they would return later in the autumn. Not desiring to expose his men to danger without their consent, he asked them whether they would winter there with him, as if they went back to the woods for winter, they would be too far away from their work in the spring. All agreed to stay. They then built a store house, with the door composed of skin on a frame, and took up their quarters while the clay was still wet. In fact it never dried; but after a time it froze, so that the place became quite comfortable. A curious effect produced was that it rather destroyed the lecturer's library. He had put his books on a piece of board on the wall where they became so damp from the moisture of the house, that when the frost came they froze solid. As their fuel was heather which they scraped up and which required much blowing to do their cooking, it would have destroyed the books to put them near the fire; so the only resource was to put them beside him. Having thawed out two or three in this way, he distributed the others among his men who did the same; so that all came out right in the end, though the books still bore marks of the experience. All their drink was tea and water, not a drop of wine or spirits being used. In practice he was not a teetotaller, but he knew that spirits were very injurious in a cold climate. The deer having begun to return, one hundred and twenty were killed before the end of October. Their skins were used for clothing, and the lecturer became easy and comfortable in his mind, knowing that the party were now saved from starvation, though real hard work had been required to get the animals. Although he had been brought up rather a keen sportsman in the north of Scotland, he had never shot deer before; yet he himself killed about half of the deer which kept them all winter. About a ton of stone had to be piled upon every one of the animals to keep the wolves and foxes from eating them. Sometimes the deer were hauled about a mile to the stones; at other times it was more convenient to haul the stones to the deer. Sometimes six or seven deer were taken in a day; and precious care was taken to save every bit of them. The blood was found to make beautiful soup, and it was saved by being put into the stomachs of the animals, which were prepared for the purpose by being turned inside out and rubbed with snow. When cooked with a little flour it made a very wholesome, nice dish. The Esquimaux, as regularly as possible, saved up the stomachs of the deer to be eaten in a frozen state. They had a sourish taste, and were not at all unpleasant, and they were a preventive of scorbutic diseases. The party lived very comfortably. A school was opened, but ink could not be used, as everything was frozen. They also could not wash, as the water froze immediately on coming in contact with the hair or beard. Clothes could not be washed but were cleaned by tramping them in the dry snow. This was done with the blankets every week; and they kept their bodies clean by rubbing them with snow, never using water except for drinking. Attempts to wash linen resulted in its being frozen hard in drying, so that it was broken in pieces by the action of the wind. It took two hours to boil the kettle, and the door had to be left open as the smoke would not go up the chimney. No advantage was derived from the fire in respect to warmth, but, on the contrary, the temperature of the house fell from fifteen to twenty degrees while the fire was on, in consequence of the door having been left open. Hence they were glad to get the kettle off, and would eat the food even before it was well cooked. Their Christmas was as jolly a one as they had ever spent. As was the custom of the Hudson's Bay Company's officers all over the country, he had kept a little spirits to give a glass to every man at Christmas time. Their Christmas dinner consisted of a glass of hot brandy and water, some venison, and a very good plum pudding; and a game of ball served to give an appetite. This was the lecturer's first expedition. All the party were green at the work. They tried to follow the habits of the Esquimaux as far as they could. One thing they did which had never been done by those in charge of Government expeditions, as soon as they saw a snow hut made, they set to work to construct one for themselves. The shape was that of a bee-hive, and the walls were six inches thick. A great deal of ingenuity was required to build it properly. It was so translucent that one could read and write inside, and it was the best shelter that could be

had. His object, in making his men learn to do this, was that when overtaken by the frequent storms in travelling, they might run up in half an hour or less, a shelter that would completely protect them from the cold until the weather changed for the better. In the spring they prepared to make long sledge journeys, the first that were made along the Arctic coast in America. The sledges they made were like toboggans, with runners to protect from the ice; and they were loaded with about two hundred pounds per man. They travelled to the point where Sir John Ross had turned back and completed that line of route. Other time pieces having failed, there was at length but one watch left which the lecturer had given to one of his men. The mainspring of this broke also, and though it was repaired once or twice, it still gave way until an old spring, which had been notched and converted into a saw, for cutting iron, was found and inserted, after which it went famously the whole season; although a watchmaker, to whom it was afterwards shown, would scarcely believe the fact. With nothing but this watch and a compass to guide them, they succeeded, after a journey of 300 and 400 miles, in striking within a couple of miles, the point for which they were aiming, and where they found marks of Sir John Ross. They at length turned back, having done over twenty miles a day during the whole journey. In returning along the shore with his one or two men, one of the hardest of their experiences was encountered. The masses of ice were so rough and the rocks so bold and rugged that they could not use their sledges, and so had to carry everything on their backs a distance of 500 miles. No such a thing had been before attempted in the Arctic regions. They underwent several curious experiences. Running short of food, they were reduced to eat pieces of bone, and skin, etc. Ptarmigan they ate, bones and all, from the beak to the toe-nails. They killed one deer and ate him up, stomach and everything that was eatable, except the skin. The lecturer had never used tobacco; but a curious effect upon the poor men when they ran short of it was such a craving that they ate the linings of their coat pockets and chewed and smoked everything that had the taste or smell of tobacco. Having reached their supplies, although starving, the first thing they did was to have a chew of tobacco and a smoke. On getting back they found an immense quantity of salmon at the place. One morning 170 were killed, weighing, on an average, about five pounds each, and ranging from four to fifteen pounds. The sagacity and acuteness of the salmon were shown in the fact that, although they had never seen a net before, yet, having once come in contact with it, no power could drive them back to it, but they would run between the legs of the men to escape. The lecturer considered the Esquimaux the finest savages in America. The Danes spoke favourably of them in Greenland; so also did the missionaries in Labrador and all others who had come in contact with them, had found them a tractable and pleasant people. They even showed evidences of a higher civilization. An Esquimaux, on meeting strangers, first introduced himself and told his name, and then introduced his wife, and pointed to his children. When offered a present, he always offered something in return. The lecturer had never known them to beg. All their worst habits they learned from white men. Those whom he had met, had never before seen whites, except on one or two instances. The men showed great kindness to their wives. Women were treated as the equals of the men, and the children were treated with the utmost kindness. Children were dutiful to their parents. When children lost their parents, there was a regular scramble to adopt them, as it was known that they would, when grown up, take care of the aged. A young man was sometimes known to take his old father many days journey to see his birthplace before he died. It was not often that an Indian was seen to do that. They showed great gratitude for kindness received. As an instance, the lecturer told of three or four old people whom he allowed to stay near his quarters during the absence of their people. They never came to ask for food and gave no trouble. He sent his servant from time to time to see if they had food, and gave them what they wanted. After their friends had returned, having been very successful in their seal fishing, a deputation was sent to express their thanks for the kindness shown to the old people; and they continued to supply the party with all the seal fat required, refusing to accept any pay. They always started to retire from Dr

Rae's presence when they saw his breakfast or dinner brought, and even from the men's tent when they saw the kettle taken off, thus showing much delicacy. The party lived in very great amity with them. They had some curious notions. Their belief in a Supreme Being was perfect. They believed in a good and a bad spirit, but thought the good spirit so beneficent that he would not hurt them as they were his own children. If they did not behave well they would be given up to the power of the evil spirit; hence they propitiated the evil spirit that he might not hurt them. They did not worship him but they made him offerings to prevent him from injuring them. They believed that the Aurora was the spirit of the dead visiting each other in Heaven. The falling stars were of the same nature. Respecting the sun and moon they said that a man took fire to Heaven and lit the sun; that he afterwards took his sister up, but that, as he was cruel to her, she ran away and became the moon; and that he has ever since been chasing her, but has never caught her. As soon as the ice broke up in the spring, the party, after laying in a stock of fish and venison and building an oven (the latter having been done by the very good mason, the one who had built their store house, John Corrigan, one of the best men the lecturer ever had with him), they made some very good bread and started for home: got back in due time to York Factory, and went home thence by ship. The expense of the expedition amounted to but £1,400, as against, £17,000 or £18,000 by a Government ship. The lecturer concluded his account of this expedition by referring to the Esquimaux method of treating frost-bites on the face, namely, placing the warm hand upon the skin, and thus fetching back the circulation, instead of rubbing with snow and thereby taking off the skin. In 1847, Dr. Rae, a few weeks after his return, joined Sir John Richardson in another expedition to look for Sir John Franklin. They went over the continent, up the McKenzie and Copper Mine Rivers, left their boats which had been cut through by ice, and walked a long journey to Bear Lake, where they wintered. They found no trace of Sir John Franklin. In 1849 they went down the river again, but the ice blocked their passage. In 1850 the lecturer came back again, having been employed by the Government to look again for Franklin, though not knowing exactly where to go. Starting with three men in the spring from Red River before navigation opened, he made the fastest journey ever made in the Arctic Circle. He himself drafted and superintended the construction of small boats at Bear Lake. Travelling on sledges 1,100 miles, with eighty or ninety pounds weight to each man, at the rate of twenty-five miles per day, they then took their boats down the Copper Mine River. Hector McKenzie and a number of men from Winnipeg were of the party. They went all round the coast, and named the Victoria Strait. Curiously, at that time one of Franklin's ships was lying within forty miles of where they passed, though they knew nothing of it, being separated from it by a channel which was filled up with ice, forced up by a back flow. This ice forced up great masses of table rock, twelve to fifteen feet square and fifteen feet high, until they stood on edge as if placed there by the work of men. Having completed all this search without finding any trace of the ships, they came back, keeping along the outer water of the McKenzie River, Slave Lake, and Athabasca where they were frozen in. They then mounted snow-shoes and made twenty-seven miles a day over the 1,300 miles to Winnipeg, starting thence for St. Paul and travelling the intervening 450 miles in ten days walking with dogs, getting stronger and tougher all the time. In the latter part of the journey he had a cariole; and this was the only occasion on which he ever rode in one.

Dr. Rae's last expedition had for its chief object the completion of the survey of the coast of America. He had already passed over a very large portion of the Arctic coast; but there was still a piece which had not been explored, and he proposed to the Hudson's Bay Company to fit out boats for that purpose. In 1853 he started with two boats on the old route. On arriving at the old place he found the stone house which they had formerly occupied. He here renewed his former winter experience, but lived this time in a snow house. He regretted that he had not a sketch of this shelter to exhibit. He had explained to many architects in London,

but not one of them could say that he could build it. Yet, as with Columbus in breaking the egg to make it stand, it was not difficult to do after one had seen it done. The door was made very low, and the bed place was raised three or four inches above the level of the top of the door, that it might be in the warm air at the top of the house, and out of the cold draught from the door. They killed venison also on this occasion, but had more difficulty than on the former one, as he had only seven men. They continued setting their nets until the ice was five feet thick. They did not attempt using boats on this occasion. In travelling, they built a snow hut every night. Having completed the house, they took off their moccasins and the wrappings of the blankets inside, scraped them free from snow and rime, and wrapped them round their bodies so as to have them dry and comfortable the next morning. They boiled their kettle outside, so as not to be annoyed by the smoke and the fumes of the alcohol. Their only bedding was a blanket and a half and a strip of reindeer skin underneath, to keep them from thawing the snow. The quantity was only about a third of what is ordinarily used in houses, or of what would have been required in a tent. They all slept under the same covering, the lecturer taking one of the outside places, as he had to rise to take observations, and the man who had to light the lamp in the morning taking the other, the men doing this by turns. He usually slept with his face outward; but if he wished to turn, would nudge the next man and he the next and so on, when all would turn. They became so accustomed to this that they would do it without waking. In the Government expeditions every man had a great blanket bag into which he got, and a quantity of clothing besides. The weight per man in marching was ninety pounds, while in Dr. Rae's expeditions it was but thirty-five pounds, enabling them to take much longer journeys per day. In three journeys of 1,100 miles each, their average per day was 20 to 25 miles, while others made but 10 or 11 miles. The latter had large crews of sixty men or so in the ships, and so were enabled to employ auxiliary sledges, one of which returned after five or six days, another after ten or twelve, etc. Their bedding became covered with their breath, which congealed, so that the blanket bags became like sheet iron; while Dr. Rae's party were able to keep all their material dry, so that after fifty or sixty days, it was as fresh as on the first day. The latter enjoyed other advantages from having been accustomed to that sort of life in the Hudson's Bay Company's service, which was a famous school for Arctic work, the men having to travel where there was no timber or other fuel. Although living in snow huts, without fire, light, or anything beyond their bare food, there were no jollier or healthier men, there being no scurvy, rheumatism, or any other disorder among them. On their way to survey the part of the coast referred to, they met an Esquimaux whom Dr. Rae asked, as his custom was, if he had ever seen any whites before. He answered that he had seen some dead white men. A gold band which he had, he said he had got at a place where there were some dead people. That was the first trace met with of poor Sir John Franklin's party. The Esquimaux could not be got to tell where the place was. They said it was far away, and that they did not know the place, and they made other excuses. During the winter, as there were no Esquimaux passing, there was no means of knowing the facts afterwards learned. Learning what they did, in the spring, they could not clear up the question without remaining another winter. On coming back to their winter quarters, they found a number of Esquimaux with the three men whom they had left. The lecturer did not believe that the Esquimaux killed any of Franklin's people; as, if they had done so, they would also have killed his (Dr. Rae's) men, knowing that he was 200 or 300 miles away, as all their goods were piled upon the rocks with only an oilcloth over them. He believed that Franklin's men had certainly died of scurvy and starvation. Dr. Rae then hurried home and told the Government that they were looking in the wrong direction; as, when he left England, there were four ships engaged in the search several hundred miles further north. He had proved to his satisfaction that all Franklin's people were dead. He had obtained a pretty clear knowledge of where the dead bodies had been seen. He offered any quantity of weapons to the Esquimaux if they would tell him of one man living, but they shook their heads and held up four fingers to show that

they had all been dead at least four years. He came to the conclusion that they told the truth, because he found that their statement on various occasions, concerning other matters, were consistent. Their statements corresponded exactly with what Parry had mentioned thirty years before. They also told a number of things about Sir John Ross which they recollected from twenty years before, and which corresponded with the facts. They had, however, since been a good deal confused by leading questions. The story of the Esquimaux was that a party of thirty or forty men had been seen in King William's Land travelling southward and hauling their boats seawards. The land where the dead bodies had been found was described as a low, flat shore. Sir George Back had related that in 1833 or 1834 a gale of wind from the north had driven the water over the whole of these flats. A recurrence of this would cause any remains to be driven away. The lecturer had obtained in the spring either the crest or the initials of fourteen of the sixteen officers of both of the ships. Franklin himself had died in June or July, 1847, and in the winter of 1847-48 no less than twenty-four had died, nine of whom were officers. As but fifteen out of the one hundred men had died, the proportion of officers was very large. The Esquimaux state that among the dead bodies they had found bones and feathers of geese, showing that the men must have been living in June, when also the snow was a good deal off the ground and the deer were going northward, so that men such as Dr. Rae's party could have got their living. Those men, however, were very helpless, and not accustomed to hunt. Robert McClure, who made the north-west passage, saw hundreds of hare and ptarmigan and lots of deer, but in one month was only able to kill seven hares, though a hare is an easy thing to kill. The lecturer here illustrated with graphic minuteness the cunning of the hare and the fox in eluding their enemies, the fox even gnawing the rope which connected a bait with the trigger of a gun, or scraping the snow away so as to keep himself below the level of the gun while gnawing at the bait. The seal was also described as a very sagacious animal and its manner of preparing breathing places for itself in the ice, while at the same time providing for its own concealment, was described. The explorers never used any very warm clothing. They wore moleskin drawers but not so much fur as was customary here, as it would be much too heavy. In returning, they met with large quantities of ice; but they had succeeded in partly accomplishing their object and his men received a reward of £10,000. Americans had two or three times done something of the same kind, but not the same thing exactly. Dr. Rae's party did not depend at all upon the Esquimaux, but killed their own food and supplied the Esquimaux with more than they got from them. Also the Americans who went up, always had ships within a few days march of where they were. Capt. Hall went far away up Smith Sound, twelve or fifteen years after the lecturer returned. His account of a story among the Esquimaux concerning Crozier, corresponded with the circumstances of Dr. Rae's explorations; and he believed that he was the person meant, as the Esquimaux have no knowledge of names. In reference to the proposed Hudson's Bay route to Europe, the lecturer had every feeling of favour to this route and thought it would be a very great thing if practicable. If this country were to grow up to be as great a country as there was in America, every outlet that could be got for carrying out the produce, would be advantageous. Many things, however, which had been said concerning Hudson's Bay and Straits did not all agree with his own experience; for instance, that the whole bay was open all winter and that the Strait was navigable four months in the year. He went through the Strait in July, 1833, he thought, as surgeon on a sailing ship, and lay for three weeks without seeing a bit of open water. There were two ships a mile and a half apart, and ladies went from one to the other on the ice, to take dinner. They met the ship from York Factory which had been cruising backwards and forwards delayed by a barricade of ice through which no steamer could force its way. The deck was covered with two feet of ice, formed from the spray dashing over it; and the bows were covered with ice, weighing her down two or three feet by the head. That was the lecturer's first experience, but it was a very bad year. The ship got home very well the next year. When he went home in 1847, he saw very little ice; but in 1848 he met so

much ice that it was a question whether they should put back again. He spoke of sailing ships; steamers might get through better. The lecturer pointed on the map to a large body of water whence the ice must come through many islands into Hudson's Bay. In the bay itself there would be no trouble, though it was not exactly true that it did not freeze over. At the southern extremity there was no open water in winter, but the ice was four or five feet thick. He did not say that the route was impracticable, but he suggested that a good Newfoundland sealer with good men should be sent up in the early spring to see in what state the ice was. One year's observation would not decide the question; for the most experienced whaling captain could not tell how the ice would be when he went up. The Hudson's Bay Company's sailing ships never left the north of Scotland before the latter part of June, knowing that if they did they would be impeded by ice, although they were anxious to get to York Factory early in the season. He would not recommend any great expenditure of money until the facts regarding the Strait were fully established. Though the route was about 500 miles shorter, yet he feared there would be an average detention of between four and five days on each voyage. Lake Superior could, however, be navigated for six months in the year, or perhaps more; and the distance by rail from here was about the same as that to Hudson's Bay. Unless the question regarding Hudson's Strait was cleared up, he thought it would be very unwise to build the latter road. The greatest absurdities were told by men who did not know. Thus the terminus of the road was placed on a low island two miles from shore, and it was represented that there was a narrow and deep ship's channel. Gentlemen had shown him this and he could not convince them that they were wrong. Again, it was said there was a fine climate at Moose Factory, that tomatoes grew there, etc., while the fact was that a green tomato an inch and a half in size had grown in a corner exposed to the sun and coaxed with glass. So it was stated that cucumbers grew very nicely in the open air: and it was true that anything could be grown when covered with glass. The lecturer concluded with an interesting reference to the recent expedition sent out to reach the pole by sledges, and provided with a very complete outfit and the necessary qualifications of hardiness and skill in hunting. They were a plucky lot, and in every way fitted for the work. He hoped that all the expeditions now out, of which there were some six or eight, might return safe.

The lecturer having resumed his seat amid applause, a couple of gentlemen proposed questions respecting the number of occasions when he had found the Straits jammed with ice; and as to whether he thought that the climate was likely to have changed any during the past fifty years.

In answer to the first the lecturer repeated his statement that he had only been there three times. As to the second, he said that there were no facts to show that any change had taken place. Ships were still in the habit of meeting large quantities of ice. The whalers and Hudson's Bay Company's captains, with whom he had a large acquaintance, stated that the ice was as uncertain and dangerous now as it had ever been.

His Grace, the Archbishop of St. Boniface, rose to move a vote of thanks to the lecturer. In doing so he spoke in high terms of the ability of the lecturer, and of the gratitude which was due to the lecturer for the interesting moments which the audience had spent. He thought that the experience related proved what a man might do in depending upon himself. He was sure every person present was delighted with what he had heard. His Grace had frequently met men who had accompanied Dr. Rae in his expeditions; and from the way in which they spoke of him, he ought to be successful. He was always kind to his men, and took the lead, giving such an example as they were always delighted to follow, though the means at his command had been in some instances very small.

United States Consul Taylor, in seconding the motion, remarked that while he accorded heartily with every tribute to Dr. Rae as a hero of Arctic discovery, yet he begged the indulgence of the audience in a few words recognizing his later and no less eminent service to the communities of Minnesota and Manitoba, in forwarding the enterprise of an international telegraph and railway connecting the Mississippi

River and Lake Superior and Winnipeg with the mouth of the Frazer River in British Columbia, and with this view he would briefly recall some incidents of the year 1858. It was a year every way memorable. A report upon the territory of the Hudson's Bay Company, by a select committee of the English House of Commons, had made certain the speedy colonization of Central British America; Minnesota was organized in that year as a State, with ample subsidies for a railway system to the international boundary; the citizens of St. Paul inaugurated steamboat navigation on the Red River of the north; the gold discovery of Frazer River was speedily followed by the creation of the colony of British Columbia; the English Colonial Secretary, Sir Bulwer Lytton, avowed the policy of continuous colonies from Lake Superior to the Pacific, and a viaduct across British America as the most direct route from London to Peking or Jeddo; and, almost concurrently, the world was electrified by a message through the Atlantic depths, uniting Europe and America by telegraph. Then suddenly came an eclipse. The Atlantic cable, throbbing feebly for twenty days, became utterly silent on the 4th of September, 1858; the slavery agitation in the United States culminated in a civil war, convulsing one continent, and paralyzing the public activities in all the continents; and Canada, struggling with financial depression and political dissension, was groping slowly towards Confederation. Those were dark days, but the leaders of men and events, in all English speaking communities, bated not one jot of heart or hope. Passing other questions, the International Telegraph system suffered no neglect. For eight long years—from 1858 to 1866—while there was no abandonment of the scheme of an Atlantic cable—there was a most energetic movement by the Hudson's Bay Company, and the Western Union Telegraph Company, seconded nobly by the Governments of Canada, the United States, British Columbia and Russia, to reach London through North West British America, by the coasts and islands of Alaska and the plains and cities of Siberia; and it is in connection with that world-wide enterprise that Dr. John Rae became again identified with the history and progress of North America. He surveyed and designated the route from Fort Garry to Victoria, and accumulated at both points the materials for the construction of a continental telegraph—a portion of which, under Canadian auspices, was afterwards, in 1871, utilized in connecting the Province of Manitoba with the Eastern Provinces and the "rest of mankind." Granted that the successful laying of the Atlantic cable on the 27th of July, 1866, postponed the consummation of his labours, but none the less be honour to the march of Dr. Rae and his party across the continent some eighteen years since. He is welcome now in 1882 to overtake his former footsteps by rail, and to mark the innumerable signs that the world is following in his trail of 1864.

The motion was unanimously carried and the meeting broke up.

Note D. 1.

LEASE OF THE LAKE ST. JOHN AND SAGUENAY TERRITORY.

The territory down to the River Moisy, below Tadoussac, on the north shore of the St. Lawrence, and from the St. Lawrence northward as far as the territory of Hudson's Bay, appears to have been leased to "La Compagnie des Postes du Roi" for the first time in 1658, by the King of France; the lease was renewable every twenty-one years.

After the Cession of Canada to England, in 1759, the territory continued to be leased in the same manner by the English Government.

When the lease was renewed in June, 1842, to the Hudson's Bay Company, for another term of twenty-one years, the Government reserved to themselves the right of sub-dividing the country into townships for the purpose of settlement.

OTTAWA, February, 1883.

KING'S POSTS.

Lease to Hudson's Bay Company, granted under Order in Council of Lower Canada, of 26th June, 1839, and a further Order of 11th June, 1840. This Lease bears date 27th June, 1842, and grants a term of 21 years from the 2nd October, 1842.

26th February, 1852. Lease to the Hudson's Bay Company of 27th June, 1842, to be cancelled, the Company complaining of the grant of timber licenses. A new lease to be granted for the occupation of the King's Posts during the pleasure of the Crown, to be terminated at any time after a notice of 18 months. The claim of the Government against the Company for £1,800 to remain in full force, etc.

11th December, 1858. Hudson's Bay Company's Lease of the King's Posts, which ends by limitation on the 15th November, 1859. On the subject of the disposal of Salmon and Sea Trout Fisheries on the Rivers St. Lawrence and Saguenay.

JOHN J. McGEE,

C. E. C.

ORDINANCE RESPECTING THE LIMITS OF THE KING'S DOMAIN, CALLED
"TRAITE DE TADOUSSAC," OF THE 23RD MAY, 1733.

GILLES HOCQUART, ETC.

Whereas, Pierre Carlier, general lessee of the "Fermes unies" of France and of the Western Domain, represented by Sieur Cugnet, Manager of the said Western Domain, hath requested us, that for the reasons in the said request contained (and in view of the Decree of the King's Council of State, dated 16th May, 1677, the Decree of the Superior Council of Quebec, dated 19th October, 1658, leasing the "Traite de Tadoussac" to Sieur Demaure, the Ordinance of M. Raudot, dated 26th September, 1707, and the Ordinance of M. Bégon, dated 5th April, 1720), we be pleased to order that the said Carlier and his successors, lessees of the said Western Domain, their attorneys, clerks and officers, shall alone, and to the exclusion of all others, continue to enjoy the right of trading, hunting and fishing, and the right of commerce in and over the whole of the King's Domain from Ile aux Coudres to two leagues below the Seven Islands, and at the posts of Tadoussac, Chekoutimy, Lac St. Jean, Nékoubau, Mistassinoc, Papinachois, Naskapis River Moisy, the Seven Islands, and other places connected therewith, including the seigniory of Malbaye.

Therefore, to prohibit all persons, of whatever quality and condition they may be, whether merchants or *habitans* of the colony, or captains or masters of boats or ships, their crews or passengers, or any other persons whomsoever, from trading, hunting or fishing, or carrying on any commerce of any kind whatsoever, under any pretence whatever, either directly or indirectly, by themselves, or by causing to be sent through conniving Indians, merchandize, provisions, or ammunition in the lands connected with the trade of His Majesty's Domain, without the express commission or order of the said Carlier, his successors, lessees, their attorneys, clerks or officers, and in case of violation of the said order, to incur confiscation or forfeiture of arms, game, merchandize, furs and traded goods, canoes, boats, and other craft whatsoever, and a fine of two thousand livres, of which confiscated goods and fine, two-thirds shall belong and be delivered to the said Carlier, the remaining third to the informer.

To prohibit also all persons of whatever rank and condition, who shall travel with canoes or other small craft on the River St. Lawrence, from landing on the domain elsewhere than at the posts and French Missions established along that river, and in the case of their so doing that they be deemed to have traded with the Indians with intent to defraud the said Carlier of this privilege, and thus to have incurred the confiscation and fine above referred to.

To allow the said Carlier to send and keep in the posts connected with the domain, for the purpose of guarding its limits and preventing any trade prejudicial to his rights, such persons and by such route as he will deem fit, he agreeing not to carry on any trade outside of the domain while on the way to such posts.

To also allow the said Carlier, his attorneys, clerks or employees, to seize all canoes which shall be found within the limits of the said domain laden with merchandize for the trade, or furs, or other traded goods; also to seize all merchandize, provisions, ammunition which may be traded, and all furs or traded goods which, whether hidden or not, may be found within the limits of said domain, to whatever persons they may belong, as to also seize all craft whatsoever which may be found trading or which may have traded with the Indians within the limits of said domain, the goods, etc., so seized to be confiscated upon report and affirmation to that effect by the employees of said Carlier.

And in order to ensure the execution of our ordinance to allow said Cartier to cause the same to be published and posted where required and deemed necessary.

Further, taking into consideration :

1. Our ordinance on the same request dated 31st March, 1731, by which, in accordance with special orders received from His Majesty in the matter, and in order to settle in an invariable manner the limits of the Tadoussac trade, "*Traite de Tadoussac*," in the lands reserved for the King's Domain, according to the said decree of the King's Council of State, dated the 16th May, 1677, and the ordinance of Mr. Bégon of the 5th April, 1720.

We have ordered that a map shall be made of all the extent of the said Domain, on which map shall be designated the coasts of the River St. Lawrence from the lower part of Ile aux Coudres down to and including River Moisy, and inland beyond the said tract of country, the lakes and rivers which empty themselves into the River Saguenay, their course, the land through which they run from their head to their mouth, and the name of the principal posts where is or can be carried on the trade with the Indians.

We have, therefore, by the said ordinance, delegated *Sieur Aubert de la Chenaye* to survey and measure the coasts of the River St. Lawrence, which lie within the limits of His said Majesty's domain, from the lower part of Ile aux Coudres down to and including River Moisy, also the River Saguenay and the lakes and rivers discharging themselves into it, their course and the country through which they run from their head to their mouth, to make plans of surveys and keep record thereof, in the form of a journal wherein shall be recorded the length of the navigable portion of said rivers with boats or canoes, the rapids and waterfalls where carrying places "*portages*," occur, the situation and size of the lakes and rivers and of the surrounding country, the posts and stores where the trade with the Indians, or the seal and salmon fishery is carried on, also the old posts where trade was formerly carried on, the situation of which can still be recognized, the names of the Indian tribes living within the said tract of land or who might come therein for the purposes of the trade, together with the number of Indians belonging to each tribe, and generally all information required and which may serve to determine in a precise manner the extent of the trading country and its advantages, as prescribed by the special instructions accompanying our said ordinance.

2. Also our ordinance of the 12th May, 1732, by which we have appointed *Joseph Laurent Normandin*, jointly with *Sieur de la Ganière*, to carry out the instructions given in our ordinance of the 30th March, 1731, in the place and stead of *Sieur Aubert de la Chenaye*—who was compelled to return to Quebec by reason of a broken leg—in the same manner as would have done the said *Sieur de la Chenaye* conformably to our instructions of said 30th March, 1731, and for that purpose to examine all rivers and lakes discharging into the River Saguenay, westward from the Post Chekoutimy up to the height of land, there to fix the said limits by stamping the trees with a *fleur de lis*, and to keep minutes of all the above in the form of a Journal containing all observations and remarks required as per our said ordinance and instructions.

3. The minutes of the said *Sieur de la Chenaye* and *Normandin* and the map drawn in accordance therewith.

4. Also our ordinance of the twelfth of the current month, between *M. Pierre Carlier*, general lessee of the *fermes unies* of France and of the Western Domain, represented by *Sieur Cugnet* applicant, by his request of the 26th September, 1732, of the one part; and *Francois Bissot*, in his own name as also as possessor of the rights of the late *Sieur de Vallerenne* and *Jeanne Bissot* his wife, and of the late *Charles Bissot*; *Sieur Joseph Fleury de Lagorgendière* and *Claire Jolliet* his wife, daughter of the late *Louis Jolliet* and *Claire Francoise Bissot* for themselves as well as for the joint heirs of late *Louis Jolliet* and wife, respondents; and *Sieur Jacques Gourdeau* son of the late *Jacques Gourdeau* and *Marie Bissot* also respondent and intervening party, of the second part; by which we have granted acknowledgment to the respondents and intervening party, of the abandonment made by them, through their defence of the 12th April last, of all the tract of land granted to the late *Francois Bissot* *Sieur de la Rivière* by the *Compagnie de la Nouvelle France* on the 25th February, 1661, from Ile aux Œufs to River Moisy and therefore granting the request

made by the said *Sieur Cugnet* in his reply of the 31st March last, we have annexed to His Majesty's Domain the said tract of land granted to said *Sieur Bissot* from and including the said *Ile aux Œufs* to the *Pointe des Cormorans* which is four or five leagues below said *River Moisy*, and having done so we have forbidden to the said respondents and intervening party and any other parties whomsoever under due and proper penalty to directly or indirectly hunt, fish or carry on trade or commerce or establish posts within the limits of the said tract of land, the *River Moisy* or lakes and rivers running through or discharging therein or to hinder the free possession or enjoyment of said land and rivers by the said *Sieur Cugnet* aforesaid.

5. The decree of the Superior Council of Quebec, leasing to said *Sieur Demaure* the said *Tadoussac* trade, "*Traite de Tadoussac*," and containing the limits and privileges thereof.

6. The decree of the King's Council of State of the 16th May, 1677.

7. The ordinance of Mr. *Raudot*, of the 26th September, 1707, making defence to all persons, even to the Indians of other regions, to trade or hunt within the limits of *Tadoussac*.

8. The further ordinance of Mr. *Raudot*, of 7th September, 1709, prohibiting all persons from treating or entertaining the Indians of *Tadoussac*, and giving permission to sub-lessees of said *Tadoussac* trade to appropriate the goods, etc., of all Frenchmen found trading within the said limits.

9. Another ordinance of said Mr. *Raudot*, of the 7th April, 1710, giving permission to seize merchandise belonging to Frenchmen having traded within the limits of *Tadoussac*, even if the same be hidden (*en cache*) within said limits.

10. The ordinance of M. *Bégon*, of 5th April, 1720, forbidding to trade, hunt or fish within the limits of *Tadoussac*.

And all things well considered, we have bounded the King's Domain called *Tadoussac* trade "*Traite de Tadoussac*," as follows, that is to say:—By the northern coast of the *River St. Lawrence* from the lower part of the *Seigniory of Eboulements*, which lies opposite the north-east point of the *Ile aux Coudres* to the *Pointe* or *Cap des Cormorans*, about ninety-five leagues front, together with *Ile aux Œufs* and other islands, islets and shoals adjacent thereto; thence westwardly by a line drawn east and west, beginning from the lower portion of the *Seigniory of Eboulements* up to the *Height of Land*, at the carrying place (portage) of *Lake Patitachekao*, latitude $47^{\circ} 15'$, at which carrying place the said *Normandin* stamped four spruce trees with four *fleur de lis*—out of which said *Lake Patitachekao* flows the *River Metabetchouanon*, which discharges itself into *Lake St. John* and thence into the *Saguenay*; thence and westerly by the *Lakes Spamoscontin*, *Sagaigan* and *Kaouakounabiscat* at the *Height of Land*, latitude $47^{\circ} 27'$, where the said *Normandin* has also stamped four spruce trees with four *fleur de lis*, he said *Lake Kaouakounabiscat* forming other lakes, and out of which flows the *River Ouiatechouanon*, which empties through *Lake St. John* into the *Saguenay*, which said two lakes shall form the boundary of the hunting grounds off *Batiscan*; and still running westwardly in the direction of *Three Rivers*, for the depth, by the height of land at about two leagues from the small *Lake Patitaouaganiche*, latitude $48^{\circ} 18'$ —where said *Normandin* has also stamped four spruce trees with four *fleur de lis*—which said last mentioned lake, together with *Lake Nekoubau*, empties into *River Nekoubau*, through *Lake Askatiche*, all of which said lakes and rivers discharge into *River Saguenay*, through *Lake St. John*, and shall be the boundary between the domain lands and the hunting grounds of *Three Rivers* and *River du Lièvre*; the said boundaries above referred to being in accordance with the journal of the said *Sieurs La Chenaye* and *Normandin* and the map drawn in accordance herewith, the originals of which will be deposited in our Secretary's office, and within which said boundaries are the posts of *Tadoussac*, *Malbaie*, *Bondésir*, *Papinahois*, *Islets de Jérémie*, *Pointe des Bersiamites*, *Chekoutimy*, *Lake St. John*, *Nekoubau*, *Chomonthouane*, *Mistassins* and beyond *Mistassins* to *Hudson's Bay*; and below the river, the domain shall be bounded by virtue of our said ordinance of the 12th of the current month, by the *Cap des Cormorans* to the *Height of Land*,

within which limits shall be River Moisy, Lake Kichestigaux, Lake Naskapis and other lakes and rivers therein discharging.

We hereby order that the said Pierre Carlier, his successors lessees of the Western Domain, their attorneys, clerks and employees, shall continue alone, and to the exclusion of all others, to enjoy the right of trading, hunting and fishing, and of commerce, in all that portion of the country lying within the above state boundaries.

We prohibit all persons of whatever quality and condition they may be, whether merchants or *habitans* of the colony, or captains or masters of boats or ships, the crews or passengers or any other person whomsoever, from trading, hunting, fishing or carrying on any commerce of any kind whatsoever, under any pretence whatever either directly or indirectly, by themselves or by causing to be sent through committing Indians, merchandize, provisions, or ammunition, in the land designated in the ordinance, and generally in or at any river or lakes flowing into the Rivers Saguenay or Moisy, although not expressly named in this ordinance, from entertaining Indian living within the said domain, or from coming within more than ten leagues from the above boundaries, for the purpose of trading with Indians or otherwise, without the express commission or order from the said Carlier, his successors, lessees, their attorneys clerks or officers, and for the violation of the said order, to incur confiscation and forfeiture of all arms, game, merchandize, furs and traded goods, canoes, boats and other craft whatsoever, and a fine of two thousand livres, of which confiscated goods and fine, two-thirds shall belong and be delivered to the said Carlier, the remaining third to the informer.

We give permission to the said Carlier, his successors lessees, clerks and employees, to send and keep in the posts connected with the domain, for the purpose of guarding its limits and preventing any trade prejudicial to his rights, such persons and by such route as he may see fit, he however agreeing not to pass outside of the boundaries fixed by this ordinance, without having first obtained permission to the effect, under penalty of all proper damages, interests, etc., to those whom it shall concern.

We also give permission to our said Carlier, his attorneys, clerks or employees to seize all canoes which shall be found within the limits of the said domain, laden with merchandize for the trade, or furs or other traded goods; also to seize all merchandize, provisions, ammunition, etc., which may be traded, and all furs or traded goods which, whether hidden or not, may be found within the limits of said domain to whatever person they may belong, as also to seize all craft whatsoever, which may be found trading, or may have traded with the Indians within the limits of said domain; the goods so seized to be confiscated, upon report and affirmation to the effect by the employees of said Carlier. And this ordinance shall be read, published and posted where needed and required.

Done at our Hotel, at Quebec, the 23rd May, 1733.

HOCQUART.

NOTE D. 2.

NOTES RESPECTING GRANT OF NORTH-WEST TERRITORY TO THE HUDSON'S BAY COMPANY.

English Parliament—Committee on Hudson's Bay Co., 1857—Report of Proceedings.

The first grant made by the Crown of England to the "Company of Adventurers of England, trading in Hudson's Bay," was on the 2nd May, 1670, under the reign of Charles II (22nd year of his reign). It incorporated the Company and granted to them "the sole trade and commerce of all those seas, straits, bays, rivers, lakes, creeks and sounds in whatever latitude they should be, that lay within the entrance of the straits commonly called Hudson's Straits; together with all the lands and territories upon the countries, coasts and confines of the seas, bays, etc., etc., aforesaid—that was not actually possessed by the subjects of any other Christian Prince or State, and that the said land should be from thenceforth . . . called Rupert's Land—constituting the Company and successors, absolute lords and proprietors of said territories . . . saving faith and allegiance to His Majesty and successors." See page 408 of Appendices.

On the 5th December, 1821, pursuant to the provisions of Statute Geo. II, 1 and 2, cap. 66, a license was granted by Geo. IV to the Company, giving the privilege to trade with individuals in all parts of North America not portion of Provinces of North America or the United States, for twenty-one years. See page 425 of Appendices.

On the 30th May, 1838, the license was renewed for a term of twenty-one years, under the reign of Queen Victoria. See page 414 of Appendices.

I could not find whether, at the expiration of the twenty-one years, a further extension of the license was granted, but I would infer in the affirmative. In 1869, one year before Rupert's Land and the North-west Territory were admitted to Confederation, I find that the Hudson's Bay Company transferred to Her Majesty, in consideration of the sum of £300,000 stg., to be paid to the Canadian Government, and of several important conditions and reservations, "all the rights of Government, and other rights, privileges, liberties, franchises, powers and authorities granted or purported to be granted to the said Company by Letters Patent from King Charles the Second, and also all similar rights which may have been exercised or assumed by the said Company in any part of British North America, not forming part of Rupert's Land, or of Canada, or of British Columbia, and all the lands and territories within Rupert's Land . . . granted or purported to be granted to the said Company by said Letters Patent." See Statutes of Canada, 35 Vic., 1872, page xxvii.

The transfer is dated the 19th day of November, 1869, and it is stated therein that the privileges, etc., transferred and surrendered by the Company to Her Majesty have been exercised by the Company ever since the date of the Letters Patent granted by Charles II.

A. GOBEIL.

29th January, 1883.

NOTE. E.

(EXTRACTS FROM THE JOURNAL OF JOSEPH LAURENT NORMANDIN IN 1732).

Joseph Laurent Normandin left Quebec on the 13th May, 1732, for the purpose of making observations from the Post of Chicoutimi to the Height of Land. He arrived at Chicoutimi, situated on River Chicoutimi, on 27th May.

River Chicoutimi.

This river possesses a rapid which necessitates the crossing of a portage, which also called Chicoutimi. The trees observed on the portage were large pines, maple, tamarack and birch.

Left Chicoutimi on 4th June for the purpose of ascending the River Chicoutimi. This river is bordered on both sides with trees of an ordinary size. The soil is sandy.

Lake Quinongaminque (Kinogami).

This lake is well surrounded with woods, consisting of tamarack, birch, etc., good size, especially on the south side. On the northern side there are several bays which discharge through a small river into the river Saguenay, which at that point called "La Grande Décharge."

Belle Rivière.

This river into which the Rivière des Anlnaies discharges, is well bordered with trees on both sides. The soil is sandy.

Lake St John.

(Piékouagami, per Charlevoix.)

(Piackouakami, per Normandin.)

Is one of the finest and largest lakes in the country. The land is good and well covered with trees. The lake is abundantly furnished with fish of all kinds.

River Nékoubau.

(Nécoupao, per Normandin.)

This river is also well bordered on both sides, with birch, pine, tamarack, etc., at its entrance there are eight islands, covered with same kind of trees. There are also several other islands on the rivers which are equally covered with trees.

Lake Nékoubau.

(Nécoupao, per Normandin.)

The soil along this lake has a very good appearance and is well furnished with spruce, tamarack and red pine.

River Métabetchouan.

(Metabetchouanon, per Normandin.)

This river, which is bordered with trees, and along which the soil appears to be excellent, is remarkable by the most difficult and dangerous portage in this region.

To give an idea of the danger of crossing same, it will suffice to say that at the season of low water, the Indians prefer to abandon their canoes than to bring them over this portage.

Normandin examined many other streams and lakes in addition to those enumerated above, amongst others, viz.:—

Lake Quinongamichice, Rivers Gouspaigane, Chigoubiche, Chéouestagano, Machékouskanouchipi, Matakouaganéchipi, and Ouiatchouanon.

On the 28th July, Normandin left Chicoutimi for Quebec, at which place he arrived on the 18th August.

Note F. 1.

ANDRÉ MICHAUX' JOURNEY FROM FRANCE TO THE UNITED STATES, CANADA AND HUDSON'S BAY, ACCORDING TO A PAMPHLET PUBLISHED AT THE SEMINARY OF QUEBEC IN 1861, BY THE REV. OVIDE BRUNET, PROFESSOR OF BOTANY AT THE LIAVAL UNIVERSITY.

André Michaux, member of the National Institute of France, and of the Society of Agriculture of Charleston, South Carolina, etc., who had visited England, the Pyrenees, Spain and Persia, where he made a magnificent collection of plants and seeds, was sent by the French Government to the United States of North America for the purpose of procuring the seeds and slips of trees, or young trees useful for cultivation in France.

He arrived in New York in November, 1785, which he selected as his principal residence, and whence he visited New Jersey, Pennsylvania and Maryland during the first two years. At the end of 1786 he sent to Paris twelve boxes of seed, several thousands of young trees, and Canadian partridges which were forwarded to Versailles for breeding.

He afterwards established a garden at Charleston, South Carolina, which he considered as a central point for his excursions.

In April, 1787, he proceeded to the Alleghany Mountains and ascended the river Savannah to its source, and thence up the sources of the River Tennessee, after which he returned to Charleston on the 1st of July, having performed a journey of 1,200 miles through the States of Carolina and Georgia.

In 1788 and 1789 he explored Spanish Florida, the Lucay Islands (Iles Lucayes) and Virginia.

He returned to Charleston in September, 1789.

During winter he visited with his son the mountains he had examined during the previous summer.

In the spring of 1790, after an absence of five and a half months, he returned to Charleston.

He left Charleston in April, 1792 for Quebec, where he intended to proceed by travelling overland. He first went to New York and New Haven, and thence up the River Hudson to Albany, where he arrived on the 14th of June; on the 18th he went to Saratoga, and on the 20th he embarked at Whitehall for the purpose of examining the plants on the shores of Lake Champlain, where he remained several days.

On the 30th of June, 1792, he arrived at Montreal, after which he went to Sorbus where he found the *Rhodora Canadensis*, a peculiar plant which is covered with blossoms before its leaves appear, and at a time when the ground is still covered with snow.

He afterwards arrived at Quebec towards the middle of July and remained there a short time for the purpose of obtaining information respecting Hudson's Bay and purchasing provisions and articles of barter, after which he proceeded, towards the third week of July, to Tadoussac, where he purchased two bark canoes and continued his journey thence up the River Saguenay to Chicoutimi, where he arrived towards the beginning of August.

As the Saguenay is interrupted by falls and rapids the remainder of the way to Lake St. John, except for the first six miles above Chicoutimi, Michaux, with three Indians and one Metis, followed the route of the River Chicoutimi to its source at Lake Kinogami, traversed the entire length of the lake, made a portage of 15 arpents to Lake Kinogamichiche, which he also traversed as far as the Rivière des Aulnes through which this lake discharges, and down which he descended into the Belles Rivière, which empties into Lake St. John; he arrived with his canoes from Chicoutimi after six days of navigation, or towards the 7th August, 1792.

He traversed Lake St. John, ascended the River Mistassini, and crossed over the Height of Land down to the Great Lake Mistassini.

Michaux, after exploring portions of the shore of the Great Lake Mistassini, went down the River Rupert during two days, and was within a short distance of Hudson's Bay, when his Indian guides refused to proceed any further north on account of the severity of the season; they assured him that if snow continued to fall it would be impossible to return.

The return journey was, therefore, decided on, although with great reluctance, by Michaux. It was accomplished with great difficulty, peril and fatigue; but he arrived safely with his party at Tadoussac on the 1st of October, having accomplished the entire journey, going and returning, between Tadoussac and Hudson's Bay in two months.

He continued thence his return journey to Quebec, whence he returned by way of Montreal and Lake Champlain, following the same route as in June to Philadelphia, where he arrived on the 8th of December, 1792.

After spending four years in the United States, he left Charleston on the 13th of August, 1796, for France. The trip across the Atlantic was nearly accomplished when the vessel was wrecked within eight miles of the coast of Holland, during a tempest. Most of the sailors and passengers would have perished, but were saved by the bravery of the inhabitants of the village of Egmond.

Michaux was found tied to the rigging, and in a fainting condition. His trunks with his clothing, which had been placed on the deck of the vessel, had been swept overboard by the waves; but his collection of seeds, plants, etc., was saved, having been stored away in the hold of the vessel. This collection has been deposited and preserved ever since in the Museum of Natural History.

G. F. B.

Note F. 2.

SAGUENAY AND LAKE ST. JOHN.

MEMORANDUM BY MR. PASCHAL TACHÉ, SEIGNIOR OF KAMOURASKA.

(Translated from Original in hands of E. C. Taché, Esq., Deputy Commissioner of Crown Lands, Quebec.)

The Committee appointed by resolution of the House of Assembly on the 29th November, 1823, to enquire into matters relating to the settlement of Crown Land directed, in order to obtain fuller information relating to the Country lying between the River Saguenay and the River Ottawa, the following series of questions to several country gentlemen in the Province, viz. :—

1st. Have you had any and what means of becoming acquainted with the River Saguenay or Lake St. John, and the streams and rivers which fall into them respectively?

2nd. What is the length, breadth, depth and course of the River Saguenay?

3rd. What are the streams which fall into that river or into Lake St. John, their length, breadth, depth and course respectively, how and for what distance navigable, and what species of fish are found in the said River Saguenay or in Lake St. John, or in the streams which empty themselves into either of them?

4th. What are the lakes in the country commonly called King's Posts, and what are their sizes, shapes, positions, depth of water and susceptibility of navigation respectively, and what are the various species of fish produced therein, and in what quantities?

5th. What is the size, shape, extent, and of what depth is Lake Mistassini situated upon the Height of Land between Hudson's Bay and Lake St. John, and what species of fish are produced therein?

6th. What is the distance of the sources of the St. Maurice, or the Black River as it is sometimes called, and the sources of the Gatineau River, from the sources of the rivers that empty into Lake St. John? Describe particularly the appearance of the country, and the source of these and of any other rivers which take their rise therein, as well from your own observation as from information upon which you can depend.

7th. Is it practicable to ascend the Saguenay in Indian canoes, pass through Lake St. John, ascend one of the streams which fall into it, and after any and what portages, descend the St. Maurice to Three Rivers? And has this route been practised for any, and what length of, time, and by whom, and what are the difficulties, obstructions or dangers to be encountered upon the said route, and are there any trading posts upon the same, and, if so, how long have they been established, and what is their number, and how situated.

8th. What are the advantages and disadvantages of the Port of Tadoussac; where does the navigation of the Gulf from that port commence and end, and at what period of time is the Saguenay frozen over, and when does the ice disappear therefrom?

9th. What are the animal, vegetable and mineral productions of the country commonly called the King's Posts?

10th. What is the quality of the soil and timber, the climate, extent of cultivable ground, as well of the country lying between the mouth of the Saguenay and Lake Mistassini, as of the country lying between the sources of the St. Maurice, and the cultivated parts of the District of Three Rivers near its mouth, and what is the course, depth and breadth of the River St. Maurice, and are there any and what obstructions

to its navigation, and what is the nature and description of the interior country lying behind the existing settlements, bounded on the one side by the Saguenay, Lake St. John, and the streams which fall into the latter lake, and on the other side by the River St. Maurice?

11th. Have you had any and what means of becoming acquainted with the country which lies between the St. Maurice on one side and the River Ottawa on the other, and if so, are there any, and what navigable streams therein, and how navigable, and for what distance, and are there any and what lakes in the said tract of country, and what is their size, depth, and situation, and do they produce any, and what species of fish, and what is the climate and quality of the soil; what trees grow in the said country, of what size, and what are the vegetable, animal and mineral productions of the same?

12th. Are there now in the said two tracts of country any tribes of Indians, and what are their numbers, manners, and means of obtaining a livelihood, and have their numbers increased or diminished since you first became acquainted with them, and, if they have so increased or diminished, to what cause or causes do you attribute their increase or diminution?

13th. Are there any, and what, traditions amongst the said Indians, relative to the late order of Jesuits, and to their labours amongst them?

To the foregoing questions Mr. Paschal Taché, Seigneur of Kamouraska, answered as follows, viz:—

I. I have wintered six times at the Post of Lake St. John, and have passed twelve years at the Post of Chicoutimish. I have, therefore, had an opportunity of knowing the River Saguenay and Lake St. John, as also the rivers and streams which respectively discharge themselves into it.

II. The River Saguenay is navigable for twenty-five leagues from its mouth, by the largest ships of the line, and for thirty leagues by vessels of 250 tons burthen, at high tide; at that point it is necessary to pass a carrying place to reach Lake St. John; the River Saguenay is half a league wide at its mouth, and further upwards it is from a league to a league and a-half wide; its mouth is easterly and it runs west-north-west.

III. Of the eighteen streams which empty themselves into the Saguenay and Lake St. John, not one is navigable. The rivers which run into the Saguenay are:— 1st. The River Ste. Marguerite; it is seven leagues from the mouth of the Saguenay to the north-east, and is navigable only for bark canoes by making several carryings; I do not know its course. 2nd. The Little River Saint Jean, which is three leagues above the River Sainte Marguerite, and runs into the Saguenay on the south-west side; I do not know whether it is navigable. 3rd. The Ha! Ha! Bay River, called by the Indians Oneshkououasha, which empties itself into the Saguenay on the south-west side; it is navigable in bark canoes, and communicates with the River Malbaye, by means of several carrying places (portages); I do not know its course; it is twenty-two leagues from the mouth of the Saguenay. 4th. La Rivière à Valin; it empties itself into the Saguenay on the north-east side; is four leagues from Ha! Ha! Bay, navigable in bark canoes, and by means of a few carryings (portages) communicates with the River Pessiamitsh; it runs north-north-east; I know its course for five leagues, and in that space there are five short carrying places. 5th. The River Chicoutimish, where the post of the same name is established, is twenty-eight leagues from the mouth of the Saguenay wherein it discharges itself on the south-west side, and has its source from the Lake Tshinougamitsh; on the south-west side of this lake there are two navigable rivers, viz: the Rivière des Sables, which communicates with the Montmorenci River by means of carrying places (portages), and the River Upikuba, which communicates with the River Batiscan, and is navigable by performing some portages; I do not know its course. To reach Lake Tshinougamitsh, there are seven carrying places (portages) to cross within the space of seven

leagues. The longest of these carrying places is three-quarters of a league, beginning at the post; the other six are from eight, to twenty arpents long. At the upper end of the said lake there is a carrying place half a league in length, which leads to the Little Lake Tschinougamitshish, which latter empties itself by the River des Aulnets into La Belle Rivière, which falls into Lake St. John; there are two carrying places (portages) of five arpents each. 6th. The River of Broken Lands (Rivière des terres rompues) falls into the Saguenay, two leagues from Chicoutimish; this river is navigable for bark canoes, and communicates by carrying places (portages) with the Great Lake Minikouagan. I know its course for five leagues; it runs north-north-east.

At the mouth of the Rivers Sainte Marguerite, Sainte Jean and Baie des Ha! Ha! salmon and salmon trout are caught in the months of June and July. No fish is caught in the Saguenay except small trout. A considerable number of porpoises ascend the river as far as la Pointe aux Roches, three leagues below Chicoutimish. A few whales also go up the river as far as the River Sainte Marguerite.

Lake St. John abounds with pike from 3 to 5 feet long, cod fish and Aouenish fish resembling salmon but much smaller and of a much finer flavour.

The rivers which flow into Lake St. John are seven in number, all navigable for birch canoes.

1. La Belle Rivière; it discharges itself at the entrance of the lake.

2. The River Metabetshouan where there was formerly an establishment of Jesuits; it communicates with the River Batiscan by a few carrying places (portages). It abounds with pickerel.

3. The River Ouiatshuan; it communicates with the River St. Maurice, and abounds in whitefish which come there in October to spawn at the foot of a fall. I do not know its course.

4. The River Ouiatshuanitch runs west and also communicates with the River St. Maurice.

5. The Ashuabmoshouan runs west-north-west and communicates with the River St. Maurice, having about thirty carrying places (portages).

There is a considerable rapid in the river and it usually takes four days to ascend it by using the pole; it is about fifteen leagues long. There is a post established sixty leagues from the mouth of that river which bears its name. From that post situated on a lake which may be four leagues long by three quarters of a league broad, a south-west course is pursued in order to reach the River St. Maurice. From the said post to one of the sources of the St. Maurice the distance is thirty leagues.

6. The River Mista-ashinitsh, which runs north, does not take its source from the lake of the same name; I only know its source for thirty leagues. After leaving this river and proceeding westward, the Lake of Father Albanel is reached, thirty (portages) from lake to lake being crossed; from these, the last portage is half a league to the great Lake Mista-ashinitsh where I have never been.

7. The River Péribuca, which runs north-west and communicates with Lake Minicouagan at the upper part of the Seven Islands and the *Islets de Jérémie*; there are several carrying places (portages).

IV. The Lakes of the country commonly called the King's Posts are:—

1. Lake St. John which is at least thirty leagues in circumference and nearly circular in form and would be navigable for schooners; in the lake there are only two small islands on the south-west side. It empties itself by two different outlets which join each other at the distance of three leagues from the lake, and there are four carrying places (portages) to pass from this lake to the point where the tide rises.

2. The Lake Ushigubish which is five leagues long by three quarters of a league broad, and discharges itself into the River Ashuabmushuan. It is navigable for schooners.

3. Ten leagues south-west of the Ashuabmushuan after crossing the River St. Maurice is Lake Kapimitshigamitsh which is four leagues long by three-fourths of a league wide and is also navigable for schooners.

4. The Lake of Father Albanel which is twenty leagues long by four wide, lies north and south, and, is navigable for schooners. There are besides several other small lakes between the Lake of Father Albanel and Lake St. John, but they are of little importance.

V. I do not know the Lake Mista-ashinitsh, not having traded further than the Lake of Father Albanel, but I have heard it said that its outlet forms the River Rupert which falls into Hudson's Bay.

VI. I know of no river under the name of Gatineau. The remainder of this question was answered in Paragraph III.

VII. The Saguenay may be ascended in birch canoes, as far as Lake St. John and further by means of carrying places (portages.)

Very few streams run into Lake St. John, and those which do so, are not navigable, with the exception of the rivers above mentioned.

I went down the River St. Maurice for a distance of twenty leagues and made three carryings (portages) from lake to lake. The first lake called Mimishkashi is three leagues long, the second, Oueshkuetauka, is seven leagues, and the third, (Lac de Travers) Cross Lake, a league and a-half, long.

I have traded at Ushkishketa where the River St. Maurice begins to flow; it is five arpents wide at that place. The North-West Company have had a post established here since 1775.

VIII. The harbour at Tadoussac is sheltered from every wind by high mountains and ships of war might anchor there in perfect safety. The navigation from Tadoussac to the Gulf is open from the end of March to the end of November.

The Saguenay does not freeze over from its mouth to the River Ste. Marguerite which is seven leagues higher up.

Thence, upwards, it generally freezes about the end of November, and the ice breaks up about the 15th May, as far as Cap au Lest, fifteen leagues above the River Ste. Marguerite. Above that, it does not freeze until the end of December, and the ice breaks up about the end of April.

IX. The animals of that part of the country, commonly called the King's Posts, are beavers, bears, otters, martens, foxes, lynxes, hares and caribou. I saw no appearance of minerals.

X. The soil commencing near the Pointe aux Roches, three leagues below Chicoutimitsh, as far up on the north-east side of the Saguenay as the River Mistassinish, a distance of thirty-three leagues, would be very rich and fertile if cultivated, forming a tract of thirty-three leagues front, by four in depth at Pointe aux Roches. The land widens towards the Mistassinish as much as fifteen leagues. Near the River Mistassinish there are a number of streamlets, the banks of which are marly. The south-west side of the Saguenay from Ha! Ha! Bay, six leagues below Chicoutimitsh, as far as Lake St. John, passing to the north-east of Lake Tshinoungami and Tshignoungamishish contains a tract of twenty leagues long by five or six in depth, of good arable land. There are a few hills on that tract of land.

The climate is generally good, owing to the number of large mountains which surround those lands; the wood, which grows from the mouth of the Saguenay to Ha! Ha! Bay, on the south side, and as far as La Pointe aux Roches, on the north east side, is small stunted red pine, which grows here and there, and of which no use can be made. In the tract above described there are several forests, containing pines, cedars, aspens, poplars; maple is not very common. On the borders of Lake St. John there are only spruce, cedar, aspen and poplar; the wood on the north side of the lake, having been burnt in 1775, is not yet full grown, but the land is excellent. From the year 1780 to 1785, I planted potatoes and cabbages at the Post of Chicoutimitsh, which came to the highest perfection, and the cabbages now exhibited at Quebec, when compared with those I raised at Chicoutimitsh, would appear dwarf cabbages, I heard Mr. Peter Stewart, who had wintered at the Post of Chicoutimitsh, say that he had sown some barley, pease and wheat, and that they all came to full maturity. I have not the least doubt of the truth of this fact.

XI.—I do not know the River of the Ottawas. Would it be that river where are the posts of Temiscaming and Abbitibi? If such is the case, I left Ashuabmoshouan and proceeded for ten leagues on a river which discharged itself into a lake, in which there are three short carrying places, the last of which is the Height of Land; thence the lake of the Thousand Islands (Lac des Mille Isles) is reached; it may be fifteen or twenty leagues in circumference; keeping west-south-west, I descended sixty leagues, as far as the Lac du Nid de Goëland; there are only two carrying places; this lake may be four leagues long by one league broad. I have traded there twice. The waters of the Lac du Nid de Goëland flow into one of the rivers west of Hudson's Bay, and that lake is to the north-east of the posts of Temiscaming and Abbitibi. The Indians informed me that it was only seven days walk, from the Lac du Nid de Goëland to the two posts of Temiscaming and Abbitibi. All the rivers which discharge their waters into Hudson's Bay abound extremely in fish, and especially in sturgeon and whitefish. The soil in the track of land above mentioned appeared to me bad, and extremely rocky. The climate is not good; the only trees which grow there are small firs, birch and spruce. The only animals to be met with are bears, otters and martens. I saw no minerals.

XII. The Indians, who live on the banks of the Saguenay and Lake St. John are Montagnais—they live entirely by hunting and fishing; they have no fixed abode and travel from place to place—most of them assemble at each post or at other places where the trade is carried on, only once in the year, and some of them never come to the posts. There were in 1778, in that part of the country commonly called King's Posts at Mingan and Mashkouara, as I was told by Mr. Peter Stuart, who had made the census, 3,500 souls. I have heard that the number has been much diminished since I was among them, which fact is attributed to small-pox and to the decrease of the means of supplying the necessaries for their existence.

XIII. I have learnt of the Indians, that they have a tradition that the late order of Jesuits had an establishment at Metabetshouan on the borders of Lake St. John; that they had erected there a chapel, a house and store where they traded. I have myself seen the ruins of a saw-mill which they had built, and I have eaten white plums, which grew in an orchard made by them.

The above are the several answers made by me to a series of questions which the President of the Committee appointed to inquire in reference to the state of the Crown Lands, had ordered the Clerk of the said Committee to forward to me.

I transmit them to you now with all due diligence, and beg that you will lay them before that Committee.

PASCHAL TACHÉ,

Seignior of Kamouraska.

February, 1823.

See Report of Committee on Public Works, in the Journals of the Legislative Assembly of the Province of Quebec, 1824.

Note G 1.

EXTRACTS FROM THE REPORT OF MR. JAMES RICHARDSON, DATED 31ST DECEMBER, 1857, ON HIS EXPLORATION OF LAKE ST. JOHN.

Mr. James Richardson and party, in accordance with instructions from Sir William Logan, F.R.S., left Montreal on the 26th May, 1857, and after an examination of a part of the Peninsula of Gaspé, arrived at the mouth of the Saguenay on the 23rd of September and sailed up the river to the village of Chicoutimi, which they reached on the 28th.

They left Chicoutimi on the 30th for Lake Kinogami. Crossing by the Bon Portage from the head of Lake Kinogami to Lake Kinogamishish, they proceeded to the foot of it, and then down the Rivière des Aulnaies, and from its mouth down "Belle Rivière" to Lake St. John. Lake St. John was examined along the coast and around its islands, and they ascended three of its tributary rivers, various distances, the "Belle Rivière," the Ouïatchouan for one mile, and the Peribonca for twelve miles.

Geographical Description of the Country.

From the mouth of the Saguenay to Cap à l'Ouest, a distance of fifty miles, precipitous cliffs rise to heights of from 300 to 1,000 feet, showing a succession of almost bare rocks of the Laurentian age, apparently gneiss. In some parts there is an abundant growth of blue-berry bushes, and some few small spruce and pine trees of different kinds.

Advancing from Cap à l'Ouest the country becomes deeply covered with post tertiary clays, through the horizontal surface of which the Laurentian rocks protrude like islands, with occasional cliffs of the same facing the bays and the rivers. These clays form an excellent soil, but in some parts, more particularly in the neighbourhood of Lake St. John, to which the clays extend, they are covered over with from one to three feet of sand and gravel; nevertheless, a small amount of labour may easily obviate the defects of the light sandy soil over a large part of this area.

The greatest length of Lake St. John is about twenty-six miles, extending in a bearing N.20W. from about the mouth of the Metabetchouan River to that of the Peribonca, and its greatest breadth about twenty miles from the mouth of the Ouïatchouanish to the Grande Décharge. The principal rivers which flow into the lake are as follows: First, the "Belle Rivière," which joins it on the south side, about six miles above the Little Discharge. Next is the River Metabetchouan, which is probably as large again as the "Belle Rivière," and is about eight miles above it. A little more than the same distance further is the Ouïatchouan, equal in size to the last, and six miles beyond it a somewhat smaller stream, the Ouïatchonanish. About the same distance farther, at the most eastern part of the lake, enters the River Chomouchouan, a couple of miles to the north of the Mistassini. These two rivers are each of them over half-a-mile wide at their mouths. About twelve miles farther is the Peribonca. Along this river large quantities of pine timber are said to exist, from which the lumbering establishment of Messrs. W. Price & Son have been furnished with a large proportion of its supply. The timber over the country described consists generally of spruce, balsam-fir, yellow and white birch and maple on clay soil, with elm and ash in low places. On the higher and more sandy parts, white pine prevails. Large loose masses of limestone are seen, which show that the country is fit for cultivation.

The cultivable land of the valley of Lake St. John, most probably occupies a very large proportion of its area, and as in the settled parts of it, good crops seem to be the general result, it appears that the valley will hereafter support a very considerable population. There appears to be no doubt in the minds of the settlers, that they are able to grow all the kinds of grain produced in the neighbourhood of Montreal, and in equal abundance, and the unexplained superiority of climate in the valley over places more to the south, renders the examination of this part of the Province, a subject of considerable interest.

Statement of Produce raised on the Farm of Messrs. W. Price & Son, Grand Bay for the season of 1857.

Produce.	Bushels Sown.	Yield 'per Bushel.	Bushels per Arpent.	Sown or Planted.	Out.
Wheat	33	15	20	5th to 20th May	15th to 20th Aug.
Wheat and Rye	44	16	24	9th to 18th May	15th to 20th Aug.
Barley	11	20	30	25th Apr. to 18th May	30th July to 13th Aug
Oats and Rye	154	12	25	9th to 18th May	19th Aug. to 3rd Sept.
Oats	238	12	30	25th April to 8th May	20th Aug. to 9th Sept.
Pease	40	10	18	1st to 8th May	31st Aug. to 22nd Sept
Potatoes	100	20	275-300	7th to 27th May	6th Aug. to 15th Oct.

Hay.—Total yield 25,200 bundles; average yield per arpent, 200 bundles; cut 27th July to 19th August.

Indian Corn.—A small quantity in the garden, good sized; picked green for use 15th August, and thoroughly ripe 15th September.

REMARKS.

Wheat.—A part sown on new ground, was stunted by dry weather in the end of June and beginning of July.

Oats and Rye being sown on new ground, they suffered from dry weather in the end of June and beginning of July.

Oats.—Being sown on new ground, they suffered from dry weather in the end of June and beginning of July.

Pease.—Other grain pressing to be cut, a scarcity of hands caused a late harvest and consequent loss by shelling.

Potatoes.—Dry, and free from disease.

Hay.—Early rain, and then frost in the spring, destroyed the roots, in some places, which produced nothing.

DISTRIBUTION OF THE ROCK FORMATIONS.

The formations which present themselves in the area above described are in ascending order.

I.—Laurentian.

II.—Lower Silurian.

III.—Post-tertiary, or Drift.

ECONOMIC MATERIALS.

Bog Iron Ore.—This ore was observed in small quantities about one mile from Ha! Ha! Bay, on the road leading from it to Bay St. Paul. Though not sufficiently numerous to be of any value, they may indicate deposits of more importance in the vicinity.

Mill Stones.—The felspathic rock at the fall on the Rivière des Aulnaies yields a material which has been applied to the manufacture of mill stones.

Garnet Rock.—In some parts of the bands of garnet rock met with in Bay St. Paul, the garnets are so closely aggregated that much of the mass might be made available as a substitute for emery.

Rensselaerite.—The thickness of the band of this mineral observed at the rapids of Peribonca is not sufficient to be made available; but the presence of the mineral in association with the labradorite rocks, gives a reasonable expectation that it may be found in larger abundance in some parts of the district in which these rocks appear so largely to prevail.

Labradorite.—Although none of the exquisitely beautiful opalescent varieties of the rock were observed, there is yet every probability that they will hereafter be discovered in the valley of Lake St. John; but the porphyroid and violet-blue descriptions met with, would give materials capable of application to purposes of decoration. The uniform colour of the mass exposed at the Peribonca rapids, and the great solid blocks that could be obtained there, leads to the belief that at some future time it might be turned to good account.

Building Stones.—Most of the lime-felspar rocks met with, would split into fine, solid rectangular blocks for building purposes, and though of course, harder than limestone, they would not be very difficult to dress. The exposure which has been mentioned near Chicoutimi would be available for building stones. About a mile west of the mouth of the Metabetchouan, the Silurian limestone would give a good, easily worked stone, in blocks of almost any required size.

Limestone.—At almost every spot where the fossiliferous limestones were met with on Lake St. John, stone fit for burning into lime could be obtained.

Common Brick Clay.—The whole district from Ha! Ha! Bay to the most westerly point of Lake St. John, on the east and south sides, abounds with clay fit for brick-making, and scarcely any place, excluding the sandy deltas of the large rivers, could be named, within a short distance of which the clay could not be rendered available for all the bricks that will ever be required.

Mineral Springs.—Mr. Richardson has been informed that there is a mineral spring not far from Chicoutimi, and another near the head of Ha! Ha! Bay.

Note G 2.

EXTRACT FROM THE REPORT OF MR. ROBERT BELL, DATED 1ST MARCH, 1858.

Mr. Robert Bell, in his Report on specimens of recent shells collected by him while accompanying the exploring party under Mr. J. Richardson, makes the following remarks on Lake St. John :—

The timber found growing round Lake St. John was of the following kinds.—White birch, balsam, pine, spruce, cedar, elm, poplar, ash, yellow birch, bass-wood and a little hard maple. Acorns were found on the shore showing that oak must exist somewhere in the neighbourhood.

Although Lake St. John is two degrees of latitude immediately north of Quebec Indian corn, wheat, and all other kinds of grain grow and ripen well in the settlements of the valley. Garden vegetables, including pumpkins, squashes, cucumbers and potatoes, seem to thrive as well as they do at Montreal. The land around the lake, with the exception of a sandy strip on the north side, is excellent, and is now in great part surveyed. There is a good Government road almost completed from Chicoutimi to the lake, so that great inducements are offered to settlers to immigrate thither.

NOTE H.

EXTRACT FROM GEOLOGICAL SURVEY OF CANADA, FROM ITS COMMENCEMENT TO 1863, RESPECTING THE SAGUENAY AND LAKE ST. JOHN REGIONS.

ANORTHOSITE ROCK.

A considerable breadth of Anorthosite rock occurs at Chateau Richer. This rock has also been met with in the parish of St. Urbain, in the seigniory of Beaupré, and it appears to be largely developed on the Saguenay, between Chicoutimi and Lake St. John. Its strike there coincides with the bearing of the river, and its breadth extends to the valley of Lake Kinogami. Much of this rock in the immediate vicinity of Lake St. John and its tributary, the Peribonca, is of a dark violet-blue colour, approaching to black, and is almost entirely made up of cleavable triclinic felspar, often having the characters of Labradorite. This species takes its name from Labrador where it was first discovered, and appears to characterize portions of the Laurentian series across the whole breadth of the Province to Parry's Island on Lake Huron, where Labradorite rock was observed in places by Dr. Bigsby.

(Page 46—Cap. III.)

LOWER SILURIAN.

Limestone from Metabetchouan to Pointe Bleue.

On the Saguenay at Lake St. John, which is nearly a degree west of the longitude of Quebec, and somewhat less than two degrees of latitude to the north of it, there is an outlying patch of Lower Silurian strata, to which attention was first drawn by Captain, now Major-General Baddeley, R.E., in the year 1828.

It probably underlies the whole lake, but the strata belonging to it have as yet been observed only on the east and west sides of it. The lower rocks of the series are limestones, and their fossils indicate that they belong to the Birdseye and Black River and Trenton formations. On the east side, the Trenton occupies a position on a flat island about half a mile to the west of the Little Discharge. On the west, the whole series of limestones extends in a belt from the Hudson's Bay Company's post, at the mouth of the Metabetchouan, to a position a little south of Pointe Bleue, a distance of about eighteen miles, whence it has been traced only five miles farther, striking westward. The details of its distribution beyond this have yet to be ascertained. The summit of the formation is well defined by the presence of the Utica shales, and its thickness does not appear to exceed a hundred feet. In the lower parts, there appears to be an intermingling of the fossils of the Birdseye and Black River with those of the Trenton. For example, about two miles west of the Metabetchouan River, in eight feet of brown compact bituminous limestone, at the base of the series, occur *Stromatopora rugosa*, *Petraia profunda*, *Receptaculites occidentalis*, and *Orthoceras Bigsbyi*, associated with *Leptæna sericea*, *Strophomena alternata*, and *Calymene Blumenbachii*.

The chief part of the limestones are of a yellowish grey, and at the Ouïatchouan in a three feet bed of this description, at the base of the series, associated with *Stenopora fibrosa*, *Petraia profunda*, *Orthis lynx*, *Murchisonia gracilis*, *M. bellicincta*, and *Trochonema umbilicata*, there was met with *Halysites catenulatus*, in no other place found so low on the American continent.

(Page 164—Cap. IX)

Utica Formation.

*The trend of the Utica formation on the south side of the Lower Silurian trough of Lake St. John, has been given in tracing the distribution of the Trenton limestone.

Hudson River Deposits.

The apparent flatness of the trough makes it probable that the formation may occupy a zone of some two or three miles wide, chiefly under the waters of the lake surrounding a considerable nucleus of the Hudson River deposits. The Utica formation on the lake, in every observed exposure, consists of the usual black and strongly bituminous shales, lying in beds from a sixteenth to an eighth of an inch thick, and the whole mass is estimated to be about a 100 feet. The change from the limestone below them is sudden, there being no interstratification of calcareous layer at the base. From a quarter to half an inch at the bottom is filled with fragments of crinoidal columns, which, being white, give to the layer a dotted grey aspect, and supply it with calcareous matter. Graptolites abound in the beds; among them is *Graptolithus mucronatus*, and there are probably some undescribed species. *Dictyonema* occurs, and among the fossils are also *Discina filosa*, *D. lamellosa*, an undetermined *Lingula*, with several new species of *Orthoceras* and *Triarthrus Beckii*.

Hudson River Formation.

The only spot on Lake St. John, where the Hudson River formation is met with is at Snake Island, where there occurs an argillaceous yellow-weathering limestone, of which only a small exposure has been seen in place. The island, which is about a mile long and a furlong wide, is covered with fragments of the same kind, and from those around the island a considerable collection of good fossils has been obtained, some of the forms among which are characteristic of the Hudson River formation. Among the fossils are *Beatricea undulata*, *Petraia corniculum*, *Ptilodictya acuta*, *Halysites catenulatus*, *Orthis occidentalis*, a large variety of *O. lynx*, *O. testudinaria*, *Athyris* *Head*, *Rhynchonella increbescens* and *Ambonychia radiata*. (Page 220—Cap X.)

Bog Ore at Ha! Ha! Bay.

Small quantities of bog ore have been found on the east side of the Ha! Ha! River, about a mile from the Bay of that name, on the road leading to Bay St. Paul. It has also been observed in this region, on the land of Mr. Joseph Tremblay, in the second range of Bagot, beyond the River St. Alphonse. These localities are mentioned, as they may lead to the discovery of more important deposits in the vicinity (Page 684—Cap. XXI.)

Limestone, for Building, at Lake St. John.

The Lower Silurian limestones about Lake St. John, afford, near the mouth of the Metabetchouan River, massive granular beds, fit for building purposes. (Page 819.)

Marine Clays in the Valley of the Saguenay.

In the valley of the Saguenay, marine clays, generally overlaid by sand and gravel, are found almost everywhere between Ha! Ha! Bay and the west side of Lake St. John; as well as between that bay and Chicoutimi, and on both sides of the Saguenay River, above and below the latter place.

Between Chicoutimi and Ha! Ha! Bay, the clay is sometimes 600 feet in thickness, and is subject to immense landslips, by which areas of many acres are sometimes removed from their original place.

Between Lake Kinogami and Belle Rivière, the clay has a thickness of 100 feet and about half a mile below the falls of the latter river, at a height of about 400 feet above the sea, it contains the shells of *Saxicava*. The same species was found on the St. Alphonse River, at a height of about 150 feet; and it was also found, associated with several other marine species, at a much lower level, in a bed of sand near Chicoutimi Church.

(Page 923—Cap. XXII.)

Note I.

DISTANCES—Telegraph Line of Dominion Government on North Shore of St. Lawrence below Quebec.

Names of Places.	Inter- mediate Distances.	Total Distances.	Remarks.
	Statute Miles.	Statute Miles.	
<i>Branch Line.</i>			
*Baie St. Paul.....	0·00	92·00	{ Commenced in August, 1880. Completed, 1st September, 1881.
*St. Urbain.....	9·00		
*Petit Lac Ha! Ha!	37·00		
St. Alexis de la Grande Baie.....	31·50		
St. Alphonse de Bagotville.....	3·00		
*Chicoutimi.....	11·50		
<i>Main Line, North Shore of the River St. Lawrence.</i>			
*Murray Bay (Malbaie).....	0·00	44·00	{ Commenced in August, 1880. Completed, 23rd July, 1881.
*St. Fidèle.....	10·00		
*St. Siméon	11·00		
Anse du Portage, on S. side of River Saguenay	23·00		
Submarine cable across the River Saguenay from Anse des Portage to Anse à l'Eau.....	1·25	45·00	{ First cable laid, 21st November, 1881; afterwards removed and a stronger cable laid in August, 1882.
*Tadoussac.....	0·75		
*Bergeronnes	15·00		
*Escoumains.....	12·00		
*Sault au Mouton or Mille Vaches.....	16·00	58·50	{ Commenced in May, 1881. Completed, 7th November, 1881. Loop line of three miles.
*Portneuf Village.....	11·50		
*Portneuf Lighthouse	9·00		
*Sault au Cochon.....	7·00		
*Betsiamits (Bersimias).....	31·00	58·50	{ Commenced in May, 1882. Completed in September, 1882.
Total, Main Line.....	.....			147·50

Telegraph Stations are marked thus (*), as per F. N. Gisborne, Superintendent of Dominion Government Telegraph and Signal Service.

Note J 1.

NORTH SHORE TELEGRAPH LINES.

STATEMENT showing the amount spent on each section from 1st July, 1880, to 25th January, 1883.

Fiscal Year.	Baie St. Paul to Chicoutimi.	Malbaie to Tadoussac.	Tadoussac to Mille Vaches.	Mille Vaches to Bersimis.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1880-1881.....	7,388 86	3,415 69	(a) 904 90	(a) 1,231 06	12,940 50
1881-1882.....	5,092 21	2,869 82	3,714 80		11,676 83
1882-1883 (to 25th Jan., 1883).....		2,722 99		7,093 28	9,816 27
Total.....	12,481 07	(b) 9,008 50	4,619 70	8,324 34	(c) 34,433 51

(a) Wire, &c., purchased and held in stock ; now used on these lines.

(b) Including \$3,541.59 for cables.

(c) Including \$9,816.27, expenditure 1st July, 1882, to 25th January, 1883.

O. DIONNE,
Accountant.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 25th January, 1883.

Note J 2.

NORTH SHORE TELEGRAPH LINES.

ABSTRACT of Expenditure from 1st July, 1880, to 25th January, 1883.

	Baie St. Paul to Chicoutimi. — 92 miles.	Malbaie to Tadoussac — 44½ miles, land 1½ miles, cable — 46 miles.	Tadoussac to Mille Vaches — 43 miles.	Mille Vaches to Bersimis. — 58½ miles.	Total. — 238½ miles, land 1½ miles, cable — 239½ miles.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wire, R. Johnson and nephew.....	1,731 47	842 23	809 28	1,100 98	4,483 96
Pins and brackets, J. Hess.....	83 36	40 37	38 97	53 00	215 70
Insulators, Excelsior Glass Co.....	113 50	55 24	53 06	72 20	294 00
Spikes, and freight on same.....	7 68	3 74	3 59	4 88	19 89
Poles, F. Gauthier.....	2,138 00	.....	.....	.....	2,138 00
do Tremblay, Dalaire and Morin.....	.....	945 00	.....	.....	945 00
Distribution of poles, F. Gauthier....	2,989 00	.....	.....	.....	2,989 00
Inspection do L. Tremblay....	245 20	.....	.....	.....	245 20
do do J. Kane.....	.....	55 25	.....	.....	55 25
do of works, J. Z. Mitchell.....	21 06	21 05	.....	.....	42 11
Construction contracts, Sylvain.....	311 64	1,268 10	.....	.....	1,579 74
do G. N. W. Tele- graph Co.....	4,186 70	1,738 30	3,540 80	6,068 50	15,534 30
struments, do	225 80	227 50	174 00	.....	627 30
do E. Chanteloup.....	.....	.....	.....	297 00	297 00
Measuring line, F. N. Gisborne.....	.....	.....	.....	519 45	519 45
Telegraphing.....	67 26	33 63	.....	.....	100 89
Advertising.....	178 82	89 41	.....	.....	268 23
Printing.....	8 97	4 49	.....	.....	13 46
Contingencies.....	172 61	142 60	.....	208 33	523 54
First cable for Saguenay, India Rub- ber Co.....	.....	334 70	.....	.....	834 70
Second cable for Saguenay, India Rubber Co.....	.....	2,706 89	.....	.....	2,706 89
Totals.....	12,481 07	9,008 50	4,619 70	8,324 34	(a)34,433 61

(a) Expenditure to 30th June, 1882..... \$24,617 34

do 1st July, 1882, to 25th January, 1883..... 9,816 27

\$34,433 61

O. DIONNE,
Accountant.DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 25th January, 1883.

Note K.

LAND ROUTE.

DISTANCES around Lake St. John, as measured on the Map published by the Department of Crown Lands, Quebec, in June, 1880.

Names of Places.	Inter- mediate Distances.	Total Distances.	Remarks.			
	Statute Miles.	Statute Miles.				
Mouth of Petite Décharge.....			At E. end of Lake St. John.			
St. Gédéon de Grand Mont.....	4·00	4·00	do	By road not completed		
Mouth of Belle Rivière.....	3·50	7·50	do	By Shore Road.		
St. Jérôme.....	4·50	12·00	At S.E. do	do		
Mouth of River Metabetchouan.....	6·00	18·00	On S. side of Lake St. John by Shore Road			
Pointe aux Trembles, or St. Louis de Chambord.....	5·00	23·00	On S. do	do	do	
Mouth or River Ouiatchouan.....	4·50	27·50	On S. do	do	do	
Notre Dame du Lac, or Roberval.....	6·00	33·50	On W. do	do	do	
Pointe Bleue Mission, Branch Road.....	See below.					
St. Prime, on S. side River aux Iroquois.	8·00	41·50	On S.W. do	do	do	
St. Félicien, on S. side of River Cho- mouchouan.....	See below.					
Outlet of River Chomouchouan.....	1·50	43·00	At S.W. end	do	do	
Outlet of River Mistassini.....	5·50	48·50	At N.W. do	do	do	
Outlet of River Peribonea.....	10·50	59·00	Northernmost end of Lake St. John, no road			
Mouth of Grande Décharge.....	19·25	78·25	N.E. end, or foot of	do	do	
Mouth of Petite Décharge.....	2·50	80·75	At E end	do	do	do
From Notre Dame du Lac, going north, to Pointe Bleue Mission or the Indian Reserve.....	4·50		On S.W. side of Lake St. John.			
From St. Prime to St Félicien on the S. side of the River Chomouchouan, fol- lowing the shortest road to the river, and afterwards going up the river...	7·50		St. Félicien is seven miles above outlet River Chomouchouan.			
Distance by direct unfinished road.....	8·50		Eight and one-half miles from St. Prime to St. Félicien by shortest, unfinished road shown on map of 1880.			

G. F. B.

Note L.

LAND ROUTE.

DISTANCES from St. Félicien, near upper or west end of Lake St. John, to St. Jérôme at south-east end of lake, and thence by the shortest post route to the Baie des Ha! Ha! as measured on the Map published by the Department of Crown Lands, Quebec, in June, 1880.

Names of Places.	Inter- mediate Distances.	Total Distances.	Remarks.
	Statute Miles.	Statute Miles.	
St. Félicien.....	8.50	38.00	On S. side of River Chomouchouan, seven miles above its outlet at S.W. or upper end of Lake St. John.
St. Prime.....	8.00	29.50	At S.W. end of Lake St. John. Shore Road.
Pointe Bleue Mission—Indian Reserve.	.....	.....	Branch road $4\frac{1}{2}$ mls. north from Notre Dame
Notre Dame du Lac, or Roberval.....	6.00	21.50	On S.W. side of Lake St. John. Shore Road.
Mouth of River Ouïatchouan.....	4.50	15.50	On S. shore do do
Pointe aux Trembles, or St. Louis de Chambord.....	5.00	11.00	On S. side do do
Mouth of River Metabetchouan.....	6.00	6.00	do do do
St. Jérôme (see note below).....	0.00	0.00	At S.E. end do do
Fébertville.....	9.50	9.50	By the most direct road eastward.
St. Syriac de Kaskouia (see note).....	14.50	24.00	By road on N. side of Lake Kinogami.
Grand Brûlé..... do	14.75	38.75	do do do
Chicoutimi..... do	12.00	50.75	By road on W. side of River Chicoutimi.
St. Alphonse de Bagotville.....	10.00	60.75	At Head or W. end of Baie des Ha! Ha! by shortest road southward.
St. Alexis de la Grande Baie.....	2.50	63.25	At S.W. end of Baie des Ha! Ha! by the shortest road southward.
N.B.			
St. Syriac de Kaskouia to St. Dominique, on east side of Rivière aux Sables.....	.....	10.50	Road is along W. side of Rivière aux Sables.
St. Syriac de Kaskouia to Chicoutimi, by road along west side of Rivière aux Sables, except upper portion.....	.....	20.50	Six and one-quarter miles shorter than road passing by way of Grand Brûlé.
Grand Brûlé to St. Dominique.....	.....	16.50	By road up River Chicoutimi and down Rivière aux Sables.
Head of Baie des Ha! Ha! below Chicoutimi.....	.....	24.30	By water route.
Head of Baie des Ha! Ha! above Tadoussac.....	.....	60.26	do

REMARK.—The mileage, in the first portion of the above table, is given from St. Jérôme going upward to St. Félicien, and from St. Jérôme going downward to St. Alphonse.

G. F. B.

.....	68-02 69-76	78-22 80-22	0-40 .....	..... On S. shore.....	No soundings... do	Tide ends	From Terres Rompues up to Lake St. John the river is interrupted by numerous rapids.
River aux Sables.....	.....	.....	.....	.....	.....	.....	.....
Grand Remous or Township line of Kinogami or River des Aulnaies.....	73-02 76-50	83-97 87-97	0-50	On N. shore	do	.....	.....
River Duclou.....	.....	.....	.....	do	do	.....	.....
River Gervais.....	82-58	94-97	.....	do	do	.....	.....
Junction of Grande and Petite Décharges.....	86-28	99-22	.....	Between N. & S.	do	.....	.....
Mouth of Petite Décharge, at foot of Lake St. John.....	96-50	110-97	0-50	N.E. end of Lake	do	.....	In a westerly direction, at E. end of Lake St. John.
Mouth of Grande Décharge, at foot of Lake St. John.....	97-58	112-22	1-00	do	do	.....	In a N.W. direction, at E. end of Lake St. John.
River Mistassini, <i>via</i> Grande Décharge.....	119-32	137-22	0-65	N.W. end of Lake	do	.....	On a direct line across Lake to its western or upper end.
River Mistassini, <i>via</i> Petite Dé- charge.....	118-02	135-72	.....	do	.....	.....	.....
River Peribonca, <i>via</i> do do	113-45	130-47	0-87	Most northerly shore of Lake..	do	.....	.....
River Chomouchouan do do	118-23	135-97	0-44	S.W. end of Lake	do	.....	.....
River Ouitchouan do do	113-02	129-97	.....	On S. shore do	do	.....	.....
River Metabetchouan.....	107-80	123-97	.....	do	do	.....	.....

NOTE.—The distances measured on the Admiralty Chart are correct. The distances given by the sailing directions in the St. Lawrence Pilot, published in 1860, from St. Etienne Bay to Chicoutimi, appear to include $1\frac{1}{2}$ mile from Tadoussac down to the mouth of the Saguenay.—G. F. B.

Note N.

POPULATION of the Counties of Chicoutimi and Saguenay, from Census of 1881.

Names of Parishes, &c., from Lake St. John downwards.	Number of Families.	Number of Persons.	Total.		Remarks.
			Fami- lies.	Persons.	
COUNTY OF CHICOUTIMI.					
Around Lake St. John.					
Township of Normandin.....	53	322	.....	.....	W. end of lake.
St. Félicien.....	114	530	.....	.....	S. side of River Chomou- chouan.
St. Prime.....	167	956	.....	.....	S.W. end of lake.
Notre Dame du Lac, or Pointe Bleue, or Roberval.....	211	1,186	.....	.....	S.W. side of lake.
St. Louis de Chambord or Pointe aux Trembles.....	182	1,067	.....	.....	W. side of lake.
St. Jérôme.....	277	1,803	.....	.....	S.E. end of lake.
St. Gédéon de Grand Mont.....	110	654	.....	.....	E. end of lake.
St. Joseph d'Alma.....	113	710	.....	.....	On island between Grande and Petite Décharges.
			1,227	7,228	
Between Lake St. John and Chicoutimi.					
Herbertville.....	421	2,501	.....	.....	1½ miles above Lake Vert.
St. Syriac de Kaskouia or Kinogami.....	40	262	.....	.....	N. side Lake Kinogami.
St. Dominique, Rivière aux Sables.....	220	1,511	.....	.....	E. side Rivière aux Sables.
Grand Brûlé or Laternière.....	172	1,320	.....	.....	6 miles below outlet of Lake Kinogami.
			853	5,594	
Along the River Saguenay.					
St. François Xavier (Parish of Chicou- timi).....	355	2,687	.....	.....	S. side of River Saguenay.
Ste. Anne.....	198	1,260	.....	.....	N. do do
Chicoutimi Town.....	327	1,935	.....	.....	S. do do
St. Fulgence.....	135	845	.....	.....	N. do do
St. Alphonse.....	153	1,071	.....	.....	W. end Baie des Ha! Ha!
Bagotville (village only).....	88	508	.....	.....	do do
St. Alexis.....	287	1,749	.....	.....	S.W. do do
Anse St. Jean.....	99	653	.....	.....	S. side of River Saguenay.
			1,642	10,708	
Grand Totals.....			3,722	23,530	
COUNTY OF SAGUENAY.					
Tadoussac, at mouth of River Saguenay.	209	1,542	209	1,542	N. side.
(Population of Village comprised in Parish, 59 families; 341 persons)					

Note O.

STATEMENT showing number of trips, tonnage and crews of Steamers which have called at Chicoutimi, and other places on the Saguenay, during eight years from 1872 to 1879 inclusively.—(*Extract from the Report of Mr. Jos. Rosa, No. 2,386, dated 15th January, 1880.*)

Years.	Number of trips.	Tonnage.	Crew. — Number of Men.
1872	80	30,155	1,630
1873	91	77,208	2,730
1874	81	71,148	2,400
1875	88	76,666	2,640
1876	90	81,115	2,700
1877	96	82,356	2,880
1878	106	92,861	3,180
1879	78	72,929	2,340
Totals	710	584,438	20,500

(No. 32,026.)

NOTE P.

HARBOUR COMMISSIONERS' OFFICE,

QUEBEC, 19th February, 1883.

SIR,—I have the honour to transmit you herewith, the statement asked for in your letter of the 1st inst., respecting the coasting trade in the counties of Saguenay, Chicoutimi, and Charlevoix, from 1876 to 1882, inclusive.

N. B.—No statement has been kept of this nature from 1867 to 1876.

I have the honour to be, Sir,

Your most obedient servant,

A. H. VERRET,

Secretary Treasurer.

F. H. ENNIS, Esq.,
Secretary Public Works Department,
Ottawa.

(In No. 32,026.)

STATEMENT showing the Number of Schooners which were engaged in the Coasting Trade in the Counties of Saguenay, Chicoutimi and Charlevoix, from 1876 to 1882, inclusively, according to the Entries made in the Books of the Quebec Harbour Commissioners, showing Number of Trips, Tonnage and Crew for each Year and each Port.

Number.	Name of Ports.	1876.				1877.				1878.					
		No. of Schooners employed.	Aggregate Tonnage.	No. of Crew.	No. of Voyages effected.	No. of Schooners employed.	Aggregate Tonnage.	No. of Crew.	No. of Voyages effected.	No. of Schooners employed.	Aggregate Tonnage.	No. of Crew.	No. of Voyages effected.		
<i>County of Saguenay—North Shore of the St. Lawrence.</i>															
1	Baie des Mille-Vaches.....	12	512	24	17	2	88	4	3	8	343	16	14		
2	Sault au Mouton.....	.....	.....	.....	.....	2	167	6	3	.....	.....	.....	.....
3	Petsiamits.....	5	106	11	6	4	69	8	4	6	140	12	7		
4	Sault au Cochon	3	115	6	5	2	77	4	6	3	181	6	8		
5	Escoumains	2	68	4	2	4	173	9	4	2	38	4	4		
<i>River Saguenay—Counties of Saguenay and Chicoutimi.</i>															
6	Tadoussac.....	1	34	2	1	4	150	8	5	5	165	10	6		
7	Anse St. Jean.....	5	203	10	5	1	46	2	2	5	155	10	5		
8	Baie des Ha! Ha! .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Chicoutimi.....	4	329	10	6	6	439	14	11	6	337	13	7		
10	Saguenay, without special designation of port.....	55	2829	117	112	36	1941	74	86	37	1816	75	119		
<i>County of Charlevoix—North Shore of the St. Lawrence.</i>															
11	Black River.....	2	74	4	5	6	229	12	8	4	136	8	17		
12	Baie des Roches .....	.....	.....	.....	.....	1	41	2	1	.....	.....	.....	.....
13	Cap à l'Aigle.....	3	124	6	4	1	40	2	1	5	236	10	5		
14	Murray Bay.....	24	921	49	50	37	1365	74	75	28	826	56	92		
15	St. Irénée.....	2	54	4	2	2	42	4	5	5	197	10	10		
16	Eboulements	12	430	24	24	15	568	30	23	17	623	34	53		
17	Ile aux Coudres	9	200	18	14	13	253	26	16	18	418	36	48		
18	Baie St. Paul.....	15	552	30	30	18	674	36	39	21	812	42	82		
19	Petite Rivière St. François Xavier	10	299	20	19	10	304	20	25	12	329	24	57		

STATEMENT showing the Number of Schooners which were engaged in the Coasting Trade in the Counties of Saguenay, Chicoutimi and Charlevoix, &c.—*Concluded.*

Number.	Name of Ports.	1879.			1880.			1881.			1882.						
		No. of Schooners employed.	Aggregate Tonnage.	No. of Crew.	No. of Voyages effected.	No. of Schooners employed.	Aggregate Tonnage.	No. of Crew.	No. of Voyages effected.	No. of Schooners employed.	Aggregate Tonnage.	No. of Crew.	No. of Voyages effected.				
County of Saguenay—North Shore of the St. Lawrence.																	
1	Baie des Mille-Vaches	4	239	8	6	6	258	13	9	10	374	20	22	4	181	8	10
2	Sault au Mouton	2	104	4	2	2	114	5	3	3	159	7	4	5	230	10	8
3	Betsiamits .....	.....	.....	.....	.....	2	136	5	2	4	273	9	4	2	4	5	10
4	Sault au Cochon	1	37	2	6	5	254	11	17	7	339	14	14	2	127	4	14
5	Escoumains	8	206	16	12	6	168	12	19	6	254	16	22	1	90	3	4
River Saguenay—Counties of Saguenay and Chicoutimi.																	
6	Tadoussac	4	108	8	7	2	63	4	3	1	34	2	5	3	74	6	18
7	Anse St. Jean	2	71	4	4	1	44	2	2	8	298	16	12	6	231	12	13
8	Baie des Ha! Ha! .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	Chicoutimi	8	509	16	11	8	485	17	12	11	692	23	20	9	528	18	13
10	Saguenay, without special designation of port.	39	2093	82	128	42	2115	88	143	29	1413	58	94	35	1715	72	102
County of Charlevoix—North Shore of the St. Lawrence.																	
11	Black River	8	283	16	26	6	208	12	13	11	460	22	17	11	431	22	18
12	Baie des Roches .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	73	4	5
13	Cap à l'Aigle	1	32	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	Murray Bay	27	892	54	83	26	843	52	99	29	940	58	91	23	800	46	61
15	St. Irénée	3	93	6	3	3	66	6	16	4	118	8	23	8	180	16	32
16	Eboulements	12	365	24	42	13	436	26	67	13	594	26	36	13	547	26	27
17	Ile aux Coudres	15	283	30	57	13	314	26	62	11	184	22	67	15	349	30	42
18	Baie St. Paul	20	765	41	76	23	660	47	107	22	972	44	128	22	760	44	98
19	Petite Rivière St. François Xavier	7	190	14	57	6	175	12	64	12	351	24	67	7	220	14	29

Certified.

A. H. VERRET,

Secretary-Treasurer.

OFFICE OF THE HARBOUR COMMISSION,
 QUEBEC, 19th February, 1883.

(In No. 32,585.)

STATEMENT showing the number of Schooners which were engaged in the coasting trade in the Counties of Saguenay, Chicoutimi and Charlevoix, for the year 1875, according to the entries made in the books of the Quebec Harbour Commissioners, showing number of Trips, Tonnage and Crew.

Number.		Schooners.	Tonnage.	Crew.	Trips.
1	Baie des Mille-Vaches	7	403	36	12
2	Sault au Mouton	1	25	3	1
3	Betsiamits	2	66	5	2
4	Sault au Cochon	1	40	3	1
5	Escoumains	3	158	12	4
6	Tadoussac	1	18	2	1
7	Anse St. Jean	2	49	5	2
8	Baie des Ha! Ha!	1	32	3	1
9	Chicoutimi	5	206	14	5
10	Saguenay	35	2,851	176	56
11	Black River	3	130	12	4
12	Baie des Roches				
13	Cap à l'Aigle	1	24	3	1
14	Murray Bay	27	1,888	153	51
15	St. Irénée	3	140	12	4
16	Eboulements	8	295	33	11
17	Ile aux Coudres	9	249	36	14
18	Baie St. Paul	16	1,454	117	39
19	Petite Rivière St. François Xavier	12	113	89	30

A. H. VERRET,
Secretary-Treasurer.

QUEBEC, 9th March, 1883.

See preceding return 1876 to 1882 previously received.

G. F. B.

(No. 32,347.)

THE ST. LAWRENCE STEAM NAVIGATION COMPANY,
ST. ANDREW'S WHARF,
QUEBEC, 2nd March, 1883.

SIR,—In answer to your letter of the 1st February last, No. 16,813, I have the honour to send you herewith the two forms filled, showing the number of trips, tonnage, etc., of steamers which have called at the ports on the Saguenay River, from 1840 to 1882, inclusive.

I have the honour to be, Sir,
Your most obedient servant,

A. GABOURY,
Secretary.

To H. ENNIS, Esq.,
Secretary Department of Public Works.

STATEMENT showing number of Trips, Tonnage and Crew of Steamers which have called at Chicoutimi, and at other places on the Saguenay, from 1840 to 1867, inclusively.

Year.	Number of Trips.	Tonnage.	Crew.	Steamers.
1840.....	2	524	40	Unicorn.
1841.....	1	262	20	do
1842.....	1	250	20	North America.
1843.....	5	1,830	120	do and Alliance.
1844.....	4	1,165	90	Alliance.
1845.....	5	861	95	Pocahontas.
1846.....	6	1,128	112	Lady Colborne.
1847*.....				
1848.....	3	1,620	60	Alliance.
1849.....	9	1,035	135	Rowland Hill.
1850.....	9	1,035	135	do
1851.....	9	1,035	135	do
1852.....	9	1,035	135	do
1853.....	15	2,145	225	Saguenay.
1854.....	15	2,145	225	do
1855.....	15	2,145	225	do
1856.....	15	2,145	225	do
1857.....	15	2,145	225	do
1858.....	15	2,145	225	do
1859.....	15	2,145	225	do
1860.....	15	2,145	225	do
1861.....	19	5,320	570	Magnet.
1862.....	19	5,320	570	do
1863.....	19	5,320	570	do
1864.....	21	5,880	630	do
1865.....	21	5,880	630	do
1866.....	31	8,505	930	do and Champion.
1867.....	54	27,706	2,085	do and Union.

* Steamers were engaged conveying emigrants from Grosse-Ile to Montreal.

STATEMENT showing number of Trips, Tonnage and Crew of Steamers which have called at Chicoutimi and at other places on the Saguenay, from 1868 to 1882 inclusive.

Year.	Number of Trips.	Tonnage.	Crew.	—
1868.....	42	19,880	1,560	Magnet and Union.
1869.....	77	36,593	2,255	do
1870.....	84	39,526	2,395	Advance, St. George, Clyde, Magnet, Union and Clyde.
1871.....	89	41,568	2,585	do do
1872.....	80	30,155	1,630	Union and Clyde.
1873.....	{ 14	6,100	280	St. George, Clyde, Union, Saguenay.
1874.....	91	77,208	2,730	
1875.....	81	71,148	2,400	Saguenay, Union, St. Lawrence.
1876.....	88	76,666	2,640	do do
1877.....	90	81,115	2,700	do do
1878.....	96	82,356	2,880	do do
1879.....	106	92,861	3,180	do do
1880.....	78	72,929	2,340	do and St. Lawrence.
1881.....	77	73,985	3,250	do do
1882.....	100	69,598	3,500	do Union, St. Lawrence and Chicoutimi.
1882.....	67	66,959	2,890	do and St. Lawrence.

A. GABOURY,
Secretary.

(No. 31,977.)

NOTE Q.

CUSTOM HOUSE,

QUEBEC, 17th February, 1883.

SIR,—Adverting to my letter of 3rd instant, I beg to hand you a return of vessels loaded and which left sub-ports in the Counties of Chicoutimi and Saguenay, from 1852 to 1882, inclusive.

I regret to say that I could not procure the information to extend the return to the year 1840. I could find no record of the same; I applied in vain to Messrs Price Bros., and also to Mr. Radford, who has been stationed at Tadoussac since 1849. The time occupied to make these applications, I hope you will receive as much excuse for the delay in furnishing the returns.

My administration of the port commenced in 1851, since which period, return of the business of the port of Quebec can be had straight.

I have taken the liberty to send my statements on different sheets, as the sheets furnished by you, did not give a separate column for each sub-port, which details might be useful to you.

I am, Sir,

Your obedient servant,

J. W. DUNSCOMB,

Collector.

(In No. 31,977.)

QUEBEC, 10th February, 1883.

DEAR SIR,—We are sorry not to be able to give you the information you ask for of yours of the 5th instant. But we find it quite impossible to trace the number of ships sailing from the Saguenay earlier than 1873, and even then, without accuracy.

Yours truly,

PRICE BROTHERS & CO.,

Per H. R. Hurst.

To J. W. DUNSCOMB, Esq.,
Collector of Customs,
Quebec.

TADOUSSAC, 13th February, 1883.

MY DEAR SIR,—I have to acknowledge the receipt of your favour of the 3rd instant, and I am sorry I cannot forward you a statement of vessels loaded in the Saguenay from 1840 to 1852. I have no record of them; the papers of vessels cleared were forwarded to Quebec prior to 1852. Therefore I have no means of giving you the information required.

I remain,

Yours sincerely,

J. C. RADFORD.

To J. W. DUNSCOMB, Esq.,
Collector of Customs,
Quebec.

In No. 31,977.)

STATEMENT of Sea going Vessels which have loaded at and left the Ports of the Counties of Chicoutimi and Saguenay, from 1840 to 1867, inclusively, showing Number of Vessels, their Tonnage and Crew, for each Year and each Port.

Year.	Chicoutimi.			Tadoussac.			Les Escoumains.			Sault au Cochon.		
	No of Ves-sels.	Tons Register.	Crew.	No. of Ves-sels.	Tons Register.	Crew.	No. of Ves-sels.	Tons Register.	Crew.	No. of Ves-sels.	Tons Register.	Crew.
40.....												
41.....												
42.....												
43.....												
44.....												
45.....												
46.....												
47.....												
48.....												
49.....												
50.....												
51.....												
52.....	45	19,918	617									
53.....	23	10,478	329									
54.....	23	13,738	358									
55.....	9	5,771	160									
56.....	16	12,235	285									
57.....	21	13,490	324									
58.....	13	8,749	232									
59.....	28	14,534	406									
60.....	31	15,853	475									
61.....	31	21,999	541									
62.....	13	10,758	263									
63.....	21	12,244	310									
64.....	19	12,395	310									
65.....	18	14,767	385									
66.....	28	19,812	533									
67.....	13	7,892	174									

From 1868 to 1882.

68.....	17	12,301	304									
69.....	25	17,215	383	18	11,275	254	9	8,215	246			
70.....	15	11,355	243	6	4,926	101						
71.....	15	11,714	242	4	2,057	50						
72.....	34	22,077	494	1	531	12						
73.....	31	19,826	458	3	1,715	38						
74.....	44	25,270	620	7	3,170	79	6	3,127	76	1	498	14
75.....	34	17,266	442	5	2,021	57	1	654	14	6	3,275	77
76.....	28	15,682	379	3	776	29	5	2,214	61	3	1,454	35
77.....	27	18,093	398	5	3,215	73	1	271	91	8	4,441	101
78.....	34	23,375	505	7	2,735	77	5	1,752	59	8	3,745	102
79.....	34	18,160	420	6	2,583	67	.....	.....	.....	5	3,631	73
80.....	42	23,907	543	4	1,855	48	7	2,578	80	10	4,494	117
81.....	34	19,584	431	8	4,104	96	8	3,971	104	7	3,777	85
82.....	29	17,614	372	2	1,149	26	7	3,424	92	5	2,994	62

J. W. DUNSCOMB,
Collector.

CUSTOM HOUSE, QUEBEC,
17th February, 1883.

(In No. 31,977.)

STATEMENT of Sea-going Vessels which have loaded at and left the Port of Betsiamits from 1875 to 1882, inclusively, showing Number of Vessels, their Tonnage and Crew, for each Year and each Port.

Year.	No. of Vessels.	Tons Registered.	Crew
1875	3	1,449	3
1876	5	2,463	6
1877	13	9,403	19
1878	8	5,028	11
1879	10	5,352	12
1880	6	4,838	8
1881	13	6,704	15
1882	7	3,367	8

Betsiamits established a sub-port in 1875.

CUSTOM HOUSE, QUEBEC,
17th February, 1883.

J. W. DUNSCOMB,
Collector.

No. 32,159.)

(Translation.)

Note R.

PROVINCE OF QUEBEC.
DEPARTMENT OF CROWN LANDS.

QUEBEC, 16th February, 1883.

- SIR.—In answer to your letter of the 10th instant, I beg to state that,
1. There is no record in this Department of Adolphe LaRue's exploration of Lake St. John.
 2. Blaiklock surveyed the Rivers Ashuapmouchouan, Mistassini and other tributaries of Lake St. John in 1860.
 3. The plans of this survey and of P. A. Tremblay's Survey of the Peribonca and its tributaries are in this Department, together with the reports; they have not been published.
 4. In 1877, Capt. E. Deville made no report.
 5. A statement of the observations made by him, by J. Sullivan and by H. O. Sullivan is sent herewith.
 6. The reports of the explorations made in 1828 under the direction of Messrs. Bouchette, Hamel and Proulx, will no doubt be found in the Journals of the Legislative Assembly then published; they are partly given in Bouchette's Topographical Dictionary of the British Dominion in North America.

I have the honour to be, Sir,
Your most obedient servant,
E. E. TACHÉ,

Assistant Commissioner.

P. S.—I will send you to-morrow a copy of the Report of Paschal Taché on the Saguenay region.

E. BAILLAIRGÉ, Esq.
Deputy Minister of Public Works.
Ottawa.

LATITUDE of various Localities on the Saguenay and Lake St. John, established by Capt. E. Deville in 1877.

Locality.	Latitude.	Where Established.
Ashuapmouchouan	48 25 37.7	At 2 chains S. from extremity of western point at outlet of the River Métabetchouan.
Métabetchouan	48 27 05.1	At 62-26 chains, S. 59° 34' E. from post at end of line of exploration.
Mistassini	48 25 48.0	At 28 chains, S. 86° E. from outlet of Rivière aux Rats.
Mistassac	48 08 32.3	
Pointe Noire	48 07 21.5	Eastern lighthouse at Pointe Noire near entrance of the Saguenay.

magnetic variation, at Lake St. John, taken in 1872 by J. Sullivan :—15° 30' W.
magnetic variation, in the Township of Kinogami, taken by H. O'Sullivan :—18° 0' W.

(No. 32,58.)

(Translation)

NOTE S.

QUEBEC, 23rd February, 1883.

DEAR SIR,—Lake St. John by nature is very shallow, from the heavy drifts sand coming down the rivers in the spring freshets.

With regard to the depth of water in the lake, it is impossible to say, but about five fathoms is the most we find anywhere in the lake when we anchor our steamer boat.

The deepest portion of the lake is alongside the limestone banks on the Indian reserve, which is the only place where the depth, apparently to me, is a little more, but, I have never sounded.

There are no harbours in the lake during the summer, or in the rivers after the spring waters have receded, and if they deepen the outlet of the lake much, as they are doing, there will certainly be no water left in the lake, even for barge navigation in the estuaries of the rivers.

I remain, Yours truly,

D. E. PRICE,

per H. R. Hurst.

G. F. BAILLAIRGÉ, Esq.,

Deputy Minister of Public Works.

Ottawa.

(No. 32,483.)

(Translation)

ST. JÉRÔME, 19th February, 1883.

MY DEAR SIR,—It is only lately that it has been possible for me to obtain some of the information asked by Mr. Rosa some time ago.

The following appears probable:—

The St. Louis Post is supposed to have been established by the Jesuits on the banks of the Métabetchouan. I am told that twenty years ago the ruins of the foundations of the old chapel erected there by them, could still be seen. It is even further stated that the buildings owned there by the Messrs Price, stand on a lot of land formerly used as a burying ground. A person who has lived in the building stated to me that human bones were found when the excavation for the cellar was made.

With regard to the St. Charles Post, it probably stood on Point Mistassini. About the date mentioned above, it could still be seen that the land in the vicinity had once been cultivated and even ploughed on a portion which had formerly been cleared. It may then reasonably be supposed that two posts were constructed by the Jesuits in connection with their Indian missions.

In reference to the depth of the lake, Mr. Vaudal, who has navigated its waters for many years while in the employ of the Messrs. Price, states that from Lake Dumais to the Grande Décharge, the depth is not less than fifty fathoms. The channel in which that depth is found appears to have been formed by the action of the great rivers which empty into Lake St. John and thence have made their way to the Grande Décharge.

At other points the average depth at the lowest stages of water is from ten to twelve fathoms, with the exception, however, of the sand-bars which are found at the mouth of the rivers. According to Mr. Vaudal those sand bars are not an obstruction to navigation.

The above is all the information I have been able to obtain on the subject.

Cordially yours,

J. B. VALLÉE, Ptre.

G. F. BAILLAIRGÉ, Esq.,

Ottawa.

APPENDIX No. 9.

REPORT OF A COMMISSION

APPOINTED TO INQUIRE INTO THE

CAUSE OF THE FLOODS

WHICH OCCUR PERIODICALLY IN THE

RIVER ST. LAWRENCE BETWEEN MONTREAL AND QUEBEC.

APPENDIX No. 9.

REPORT OF THE FLOODS BETWEEN MONTREAL AND QUEBEC.

OTTAWA, 4th October, 1873.

(No. 22,129.)

SIR,—I am directed by the Minister of Public Works to acquaint you that an Order in Council has issued, associating you with John Dickinson, Esq., Civil Engineer, of Toronto, and Charles Logie Armstrong, Esq., of Sorel, as a Commission to inquire into and report upon the causes of the floods which occur periodically in the River St. Lawrence, between Quebec and Montreal; and I am to request that you will be pleased to adopt the necessary measures to have the said inquiry proceeded with, and a report furnished with as little delay as possible, in which you will be pleased to suggest such means as you may deem advisable to check the said floods if practicable.

I have the honour to be, Sir,

Your obedient servant,

F. BRAUN,
Secretary.

JEAN NORMAND, Esq.,
THREE RIVERS, P. Q.

ANNUAL FLOODS.

THREE RIVERS, 21st February, 1874.

SIR,—By a Commission dated 11th October last, I had been appointed, jointly with Messrs. J. Dickinson and C. L. Armstrong, Commissioner to inquire into the causes of the floods between Montreal and Quebec. This Commission was suspended at the end of the following November.

Thinking that the question of the frequent and nearly periodical floodings of the portion of the River St. Lawrence might be agitated at the next Session of Parliament and that, in the interest of your department and of the Province generally, some reliable information on the subject would be agreeable as well as useful, I have the honour of communicating to you the result of our observations as to the cause of those inundations, and of showing, respectfully, the means which, in my humble opinion, according to our incomplete inquiries, would be the easiest and most economical to prevent the return, at least partially, of those disasters.

We left Quebec (my colleagues and myself) on the 7th November, running up the river on a steamboat. We examined all the shore irregularities on both sides of the St. Lawrence, and inquired from the coast inhabitants the date of the taking of the ice, the peculiarities of its formation, and the apparent causes of the jams in the different localities. In the researches which we decided to make, we were necessarily obliged to accept all the testimonies with a certain amount of discretion. A great number of the coast inhabitants, especially at places where the shores are steep, do not suffer from the inundation, and think only of the advantage of having an ice bridge, and of the means of obtaining it; but we were impressed that our mission was above all, to prevent, if possible, the disastrous overflows of the St. Lawrence without putting any obstacle to the free navigation of the river. That was the aim of our studies and inquiries.

We visited more particularly the following places: St. Nicholas, the Saut de la Chaudière, Pointe-aux-Trembles, les Ecureuils, le Platon, Grondines Point, Cape Charles or St. Jean Deschailions, Batiscan, Champlain and Three Rivers, where, on the 12th of November, the winter season and the abundance of ice obliged us to give up our work. We then decided to continue the inspection of the river in winter vehicles, as soon as the state of the roads would permit it.

Consequently, on the 25th of November I reached Batiscan and Grondines, and, on the 4th of December went down to Quebec to examine the ballast ground for inward ships, and, also, notice the passage of the ice at St. Nicholas.

It was on my return from Quebec that I was informed of the suspension of the commission.

These different inspections convinced us that the floods were principally caused by the following obstructions which are found along the river between Three Rivers and Quebec.

At St. Nicholas (New Liverpool) on the south shore, in the vicinity of Quebec, there is a wharf, 200 feet long, (Bazile's wharf), built on a ledge of rocks which itself runs out into the river for a distance of 100 feet. The very sight of the wharf and the ledge of rocks makes one understand that there is at that spot a formidable obstacle to the passage of the ice during the fall and especially at its breaking up, in the spring. The "hummooh" ice which is carried down the river by the current, naturally strikes that obstacle, gathers there and jams at Cap Rouge. We have the testimony of several persons of the locality to confirm our assertion. Last spring, that wharf, though of strong build, was removed from its base for a distance of 10 feet, by the pressure of the jammed ice.

In the other localities which we have inspected, above St. Nicholas and Cap Rouge, we have verified that the jams were invariably formed by immense sheets of ice which, in the fall, are carried from the shores at high tide and are stopped by the obstructions in the river, viz.: the ledge of rocks at Grondines and lower down (at Cap Rouge) the St. Nicholas wharf.

We have been unable to make a thorough and detailed inspection; the season being unfavorable and winter setting in suddenly, threatened every day to shut us up in the ice.

To speak with authority on the question it would be necessary to make a careful investigation confirmed by observations taken during the four different seasons. Nevertheless I may state that if the Government is desirous of preventing the return of floods as disastrous as those of last spring, the following ameliorations may be made immediately and without hesitation.

1. Remove the St. Nicholas Wharf and the ledge of rocks which obstruct the river most evidently and cause the jam at Cap Rouge.
2. Remove the shoal which, at Grondines Point, rises above the level of low water and is the palpable cause of the jams which drive back the water from Grondines to Sorel, damaging the country on both sides.
3. Cause the ice to take early in the fall at Batiscan—which is quite easy—and consequently prevent the heaping up of ice in the Richelieu Rapid.
4. Remove the shoals in the Richelieu, or dig a new channel on either side of the river so as to give a free outlet to the water.
5. Have a screw steamer suitable as a winter ferry between Quebec and Lévis, but which could also be utilized to break the ice which jams at the Chaudière Falls or above, as far as Batiscan.

6. Prevent the inward ships from throwing their ballast near the falls (Chaudière) considering the narrowness of the river at that point.

In causing the ice to take near the falls at Batiscan, and in using a steamer to break that which might stop between Batiscan and Quebec, besides the immense advantage of putting a stop to the periodical floods, it would be a great boon to trade and navigation, by hastening the breaking of the ice in the spring.

When those ameliorations are completed there will still be some inundations, but certainly their frequency and violence will be greatly diminished. One cannot

with certainty of success fight against the laws of nature; no one could prevent the River St. Lawrence running through milder latitudes before it comes and moderates its impetuous course in our glacial regions. Nevertheless in clearing the river of its natural or artificial obstructions, it would give an outlet to both the water and ice, and put a stop to those periodical disasters of which a considerable portion of the population of the Province of Quebec have been victims.

This is at least the opinion which I am happy to submit, hoping that it may be useful in due time.

I have the honour to be, Sir,
Your obedient servant,

JEAN. B. NORMAND.

To the Honourable,
The Minister of Public Works,
Ottawa.

MONTREAL, 4th December, 1873.

[Circular.]

SIR,—Having been appointed members of a Commission, in view of finding the causes of the periodical floods which take place on the shores of the St. Lawrence between Montreal and Quebec, we are desirous, during the present winter, of obtaining all the information possible on the matter.

Consequently we have the honour of addressing you this circular, and calling your particular attention to the following items:—

1. Date of the taking of the ice in your locality.
2. Spot where it first settles.
3. Changes, whatever they may be, which take place during the winter.
4. Date of the breaking up of the ice.
5. Spot where it moves for the first time.
6. Spot where the jam takes place.
7. Details concerning the starting point of the ice which jams.
8. The different levels of water at different epochs of the winter (with dates).
9. Extent of ground covered by the inundation.
10. At what distance the jam causes the water to run up the river.

Besides, you are requested to inform us of any other thing which might throw light on the subject.

Hoping that we may have the pleasure of meeting you now and then, this winter

We have the honour to be, Sir,
Your obedient servants,

JOHN DICKINSON, *President*,
CHAS. ARMSTRONG,
JEAN NORMAND.

APPENDIX No. 10.

REPORT ON THE IMPROVEMENTS

MADE IN THE

HARBOUR OF MONTREAL,

AND ALSO ON THE

DEEPENING OF THE CHANNEL

BETWEEN

QUEBEC AND MONTREAL,

BY THE

MONTREAL HARBOUR COMMISSIONERS.

APPENDIX No. 10.

REPORT ON MONTREAL HARBOUR; AND ON CHANNEL BETWEEN MONTREAL AND QUEBEC.

HARBOUR COMMISSIONERS OF MONTREAL,
 SECRETARY'S OFFICE,
 MONTREAL 4th January. 1883.

SIR,—In compliance with the request contained in your letter of the 11th ult. I beg to forward herewith the Reports on the improvements in the Harbour and the River since 1867.

I am, Sir,
 Your obedient servant
 H. D. WHITNEY,
Secretary.

F. H. ENNIS, Esq.,
 Secretary Department of Public Works.
 Ottawa.

HARBOUR OF MONTREAL.

HARBOUR COMMISSIONERS OF MONTREAL,
 CHIEF ENGINEER'S OFFICE,
 MONTREAL, 29th December, 1882.

The city and harbour of Montreal are situated on the north side of the River St. Lawrence, 986 miles from the Straits of Belle Isle and immediately below the Lachine Rapids, or in other words, at the head of navigation in that part of the river level with the sea, and the highest point to which the larger sea-going vessels can ascend to meet the vessels of the great inland lakes.

Up to 1825, there were only two small wharves in existence. They were situated on the shore, between what is now the Custom House Square and the foot of the Lachine Canal, and had a frontage of about 1,120 feet with about two feet depth of water at the lowest stage.

In 1825, (the year following the opening of the first Lachine Canal) the upper wharf was replaced by the "Canal Wharf" which was extended to 1,260 feet in length, and placed in about five feet of water.

In 1830, the *Harbour Commissioners of Montreal* were constituted for the management of the harbour, and by them the construction of the first regular system of wharfage was undertaken.

Between 1830 and 1832, several of the present wharves, including the Island Wharf, and those immediately above and below it, were built of piles, with from five to twenty feet of water in front of them. They replaced the remainder of the original shallow water wharves, and increased the wharfage to an aggregate frontage of 4,950 feet or nearly a mile.

No further additions were made until 1840, but in that and the following six years, extensions were made both above and below those of 1830 and 1832, and increasing the total frontage to 7,070 feet or 1.55 miles.

The basins of the enlarged Lachine Canal, opened in the spring of 1848, supplied a considerable extent of wharfage; but in the harbour proper, excepting two new wharves built in ten feet water in the then lower part, no further additions were made to the wharfage until 1856. Dredging operations which had been undertaken for deepening the river below the city, were by that time sufficiently advanced to allow of vessels reaching Montreal with a draught of thirteen feet at ordinary low water, instead of eleven feet as before, and it was then also determined to continue the deepening of the ship channel.

A regular line of large steamers between Montreal and Liverpool had also been established, and the necessity for deep water wharfage which thus arose was met by the construction in 1856, of the Hochelaga Wharf in twenty feet water, at the lower limits of the city and below the Current St. Mary.

The deepening of the shallow upper parts of the harbour, and the re-building of some of the old wharves to a greater depth, were also undertaken about the same time.

The deepening and improvement of the central part of the harbour and the extension of its wharves upward and downward, have been regularly carried on to the present time, as the deepening of the ship channel and the increase of trade demanded, and until there is now an unbroken line of wharves from Point St. Charles to Hochelaga of three and one-half miles.

At the date of Confederation, which was shortly after the ship channel had been deepened to twenty feet at ordinary low water, the wharfage was of the following extent:

	Miles.
In twenty feet depth of water.....	1.39
Under " "	1.78
Total.....	3.17

At the close of the fiscal year, 30th June, 1882, the extent was as follows :

	Lineal feet:
In twenty-five feet depth of water.....	16,458
In twenty " "	2,391
In ten to twenty (including Longue Pointe wharf).....	5,960
	24,809

4.7 miles

As already stated, the earlier wharves were built of piles placed in a close row in front, and secured to framing in rear, and also backed solid with earth and stone lining. From 1846 to 1878, the wharves were built exclusively of crib-work, strongly framed, of pine and other suitable timber, and filled and backed with stone ballast or with ordinary dredgings from the harbour.

Since 1878, open pile work has been used for some wharves in sites not exposed to violent shoving of ice, or for enlargement of existing wharves, but the use of crib-work for the more important wharves has been continued.

All the wharves are entirely submerged in winter, and owing, doubtless, to this, the timber is of unusual durability. Some pile-wharves of 1830, which are in deep water, and therefore did not need to be superseded, are still in use. The crib-work wharves are found to suffer no serious decay for about fifteen or twenty years, and even only to a depth about half way between the top and the low water line.

At the date of Confederation, the indebtedness of the harbour of Montreal was about \$1,126,000; since that time there has been expended in the harbour proper over \$1,520,000, making in all \$2,646,000; the present indebtedness is \$1,881,000, leaving a difference of \$765,000 which has been paid out of the revenue. More than this sum has, however, been expended out of the revenue, and the total cost of the harbour of Montreal, extending from the River St. Pierre to Longue Pointe, was at

the close of the year about \$3,000,000. The whole of this has been provided by the Harbour Commissioners, and the interest on the borrowed portion is met by the duties levied upon vessels and their cargoes.

The following is the number and tonnage of sea-going and inland vessels which arrived in Port since Confederation:—

Sea-going Vessels.			Inland Vessels.		
Year.	No.	Tonnage.	Year.	No.	Tonnage.
1867	464	199,053	1867.....	5,248	744,477
1868	478	198,759	1868.....	5,822	746,927
1869	557	259,863	1869.....	5,866	721,334
1870	680	316,846	1870.....	6,345	819,476
1871	664	351,721	1871.....	6,878	624,787
1872	727	398,800	1872.....	7,150	936,782
1873	702	412,478	1873.....	6,751	933,462
1874	731	423,423	1874.....	6,855	956,837
1875	642	386,112	1875.....	6,178	811,410
1876	602	391,180	1876.....	6,083	786,083
1877	513	376,859	1877.....	6,333	847,978
1878	516	397,266	1878.....	5,502	764,243
1879	612	506,969	1879.....	5,698	817,243
1880	710	628,271	1880.....	6,489	1,044,380
1881	569	531,929	1881.....	6,030	949,380
1882	648	554,692	1882.....	5,917	848,780

JOHN KENNEDY,
Chief Engineer.

IMPROVEMENT OF THE SHIP CHANNEL OF THE ST. LAWRENCE BETWEEN MONTREAL AND QUEBEC.

HARBOUR COMMISSIONERS OF MONTREAL,
CHIEF ENGINEER'S OFFICE,
MONTREAL, 26th December, 1882.

Previous to the date of Confederation, 1st July, 1867, the ship channel had been improved at various times, until, at that date, there was, throughout the whole distance between Montreal and Quebec, a minimum width of 300 feet, with a depth of 20 feet at ordinary low water.

Shortly after the depth of 20 feet was attained, the growing trade of the St. Lawrence, and the increasing size of vessels, demanded that the ship channel should be again deepened, and an Act was passed by the Dominion Legislature, in May 1873, (36 Vic. chap. 60), authorizing the Government to contract a loan of \$1,500,000 to defray the expense of completing the ship channel from Montreal to tide water above Quebec, to a "depth of not less than 22 feet at low water, and a width of not less than 300 feet," the work to be performed under the superintendence of the Department of Public Works, either by the Harbour Commissioners, or in such other manner as the Governor-in-Council might determine. It was further provided that the interest on the loan, fixed at 5 per cent. per annum, and a sinking fund

of 1 per cent., should be paid by the Harbour Commissioners out of the revenues of the Port of Montreal.

Authority was soon after given the Harbour Commissioners to proceed with the deepening, in terms of the Act, and the Commissioners determined to carry out the work with their own staff and dredging plant, as in the previous deepening. Operations were commenced in the spring of 1874, with one dredge and a stone lifter, the only suitable plant on hand, and contracts were entered into for building six large elevator dredges, and also for the building and purchase of tugs, scows and other plant required for the work.

The new plant was finished and set to work in the spring of 1875, and was kept steadily at work during the season of navigation until the close of 1878, when a minimum depth of 22 feet at ordinary low water had been attained at all points, except between Cap Levraut and Cap Charles where it was necessary to take advantage of the tide.

Up to that time there had been spent for the purchase of new dredging plant \$523,902.26, and for working expenses, \$628,610.26, or in all, \$1,152,512.52.

It was then decided in view of the rapid increase of the size and draught of vessels engaged in the Atlantic trade, and the moderate cost of carrying on the dredging with plant already on hand that the deepening of the ship channel should be continued to 25 feet at low water.

Improvements and some additions were accordingly made to the dredging fleet, and work was continued until the fall of 1882, when a depth of 25 feet was attained at all places except at Cap la Roche and Cap Charles, where it is necessary to take advantage of high water of an average tide to pass with the same draught as elsewhere.

It is suspected that there may be insufficient depth at some two or three places below Cap Charles, and that it may be necessary at these points to alter the course of the channel or to remove boulders. Surveys are being made by the Department of Public Works with a view to determine what, if anything, is required.

The following are the places at which dredging has been done:—

	English miles.
Montreal.....Gravel and sand.....	.90
Hochelega.....Stones and gravel.....	.25
Pointe aux Trembles Chan- nel.....Clay and boulders.....	3.60
Pouillier Varennes, opposite Varennes.....“ “.....	.15
Varennes to Cap St. Michel “ “.....	1.20
Curve at Cap St. Michel... “ “.....	1.40
Pointe Marie.....“ “.....	.45
Plum Island.....“ “.....	.15
Contrecoeur Channel, upper entrance.....Clay and a few boulders.....	.50
Contrecoeur Channel, main portion.....“ “.....	3.20
Contrecoeur Channel, Ile St. Ours.....Hard silt and clay.....	.85
Ile de Grace.....Sand and some clay.....	.50
Lake St. Peter, including Nicolet Traverse.....Chiefly soft clay.....	17.20
Port St. Francis.....Hard pan and boulders.....	.25
Becancour Traverse and Bend.....“ “.....	.45
Champlain Village.....Clay and boulders.....	.30
Pointe Citrouille.....Coarse sand.....	.25

St. Ann's Shoal and Cap

Levrant.....	Tough clay and boulders.....	1.00
Cap La Roche.....	Shale rock and boulders.....	.90
Pouillier Rayer.....	Boulders and clay.....	.40
Cap Charles.....	Shale rock and boulders.....	.40

Total for 25 feet channel.....	34.30
Lavaltrie Channel, 20 feet deep, clay and boulders.....	5.00

Total length dredged.....39.30

In the straight parts of the channel between No. 1 Light Ship and the White Buoy, Lake St. Peter, the dredging is 325 feet wide; in the straight parts elsewhere it is generally 300 feet, but in bends and all important places it is widened out to 450 feet or more.

The depth of the dredging at all places above Cap la Roche is 25 feet at ordinary low summer water in the river and low water of tides, but at Cap la Roche and Cap Charles there is only this depth at high water of average tides. About the beginning of June the spring freshets increase the depths everywhere above the Richelieu rapids, by 5 to 10 feet, after which the river gradually falls to normal low water about October.

The plant employed consists of:—

- Eight elevator dredges.
- One to four spoon dredges.
- Eight screw tugs.
- Two stone lifting barges.
- One side wheel steamer.
- Five barges for coal tenders and floating shops.
- Twenty-two scows.

The quantities of dredging done in deepening from 20 feet to 25 feet are:—

	Cubic Yards.
Shale rock.....	289,600
Earth of all sorts, including boulders lifted by dredges...	8,200,000
Large boulders lifted by stone lifting barges.....	16,700
Total.....	8,506,300

The channel in Lake St. Peter, the largest piece of dredging at any one place, is in all seventeen and one-quarter miles in length, with bottom level 25 feet below ordinary low water surface or $14\frac{1}{2}$ feet depth of cutting in the flats, 300 to 450 feet in width and involving the removal, since the beginning of dredging in the present channel, in 1851, of about 8,000,000 cubic yards.

The outlay for the deepening from 20 feet to 25 feet is, for dredging plant \$534,809.65, and for working and other expenses, \$1,245,321.18 or in all \$1,780,130.83

JOHN KENNEDY,
Chief Engineer.

APPENDIX No. II.

MEMORANDUM AND MEMORIAL

FROM

MONTREAL HARBOUR COMMISSIONERS

WITH REFERENCE TO THE

DEBT INCURRED BY THE COMMISSIONERS

IN

DEEPENING THE CHANNEL

BETWEEN

MONTREAL AND QUEBEC.

APPENDIX No. 11.

MEMORANDUM BY THE HARBOUR COMMISSIONERS OF MONTREAL.

Ref. No. 9763.

(Submitted to the Honourable the Minister of Public Works on the 31st March, 1879.)

The work of improving and deepening the navigation between Montreal and Quebec has been carried on, partly by the Government and partly by the Commissioners authorized by Government, or by the Commissioners acting as agents of the Public Works Department since the year 1841. In that year an Act was passed authorizing its prosecution by the Board of Works; but after the expenditure of about \$300,000, it was abandoned, and nothing further done till 1851, when an Act was passed authorizing the Harbour Commissioners of Montreal to undertake the improvements. This action was largely the result of persistent efforts made by the late Hon. John Young, who claimed that the Government plan of operations had been defective, and that the work was quite feasible, in which view he was supported by the opinions of eminent engineers, Messrs. McNeil, Childs Gzowski, and the late Sir Wm. E. Logan, who reported on the subject, and operations were accordingly recommenced on the 12th June, 1851, and in November of that year a channel had been successfully completed, having a minimum depth of 14 feet with 12 feet on the flats of Lake St. Peter, thus securing an improved navigation to the extent of 2 feet draught of water in the short period of five months.

By the 24th August, 1853, a channel 150 feet wide and 16 feet deep was obtained, and the great success of the operations encouraged the Commissioners to increased efforts, and backed by special meetings of the Board of Trade, and general public support they increased the plant and resolved to secure, if possible, 20 feet depth and 300 feet width in the improved channel.

By the year 1859, 18 feet had been reached, and the work tested by Commander Orlebar, R.N., who surveyed the St. Lawrence by order of the Admiralty, and who stated in his report, dated 26th February, 1860: "That he found a channel throughout at lowest water of 18 feet with 11 feet on the flats, and when plans of the river are published, it will be apparent to all how judiciously and successfully have all the late improvements been carried out; while the facilities of the navigation of the river are a benefit to the whole people, they are eminently calculated to increase the trade and commerce of the Canadas with the whole world."

In 1865, the channel of 20 feet deep, and 300 feet wide was finished and tested though it took a considerable period to accustom pilots and shipmasters to its use.

Nothing further was done, however, until 1873, when 36 Vic. chap. 60, authorized the Department of Public Works to proceed with the improvement under arrangement with the Harbour Commissioners limiting the expenditure to \$1,500,000. Consequent upon this legislation the Commissioners proceeded under the authority of the Department of Public Works to build new and powerful dredges, scows and other appliances at an aggregate cost exceeding \$500,000, and at the close of last season they had secured and officially tested a navigable channel of 22 feet, after expending a total sum of \$1,120,000. It is believed that the remaining \$380,000 unexpended, and the probable value of the plant will suffice to complete in three years the further work required to establish a reliable channel of 25 feet at low water, the accomplishment of which is admitted to be necessary in order to obtain the full advantage of the whole outlay for this improvement.

The importance of this work thus described, in developing the St. Lawrence as our great commercial highway, can hardly be over estimated. It is no longer necessary to argue for the superiority in economy of large vessels over small ones, as that question has been settled by universal consent and experience, while it is also an obvious fact that the exchange from small inland craft to the large ocean carrier should be made at the nearest possible point for the saving of time and money. This condition has been secured at Montreal where the canal system terminates by the improvement in Lake St. Peter and the river channel now under discussion before the commencement of which, vessels of 400 tons could not ascend the St. Lawrence without lightening cargo at ruinous cost, while now first-class steamers of 3,000 to 4,000 tons and the largest class of sailing ships frequent the port.

In fact, therefore, the improved channel to Quebec is a necessary continuation of the great St. Lawrence canals, and without it these works would practically fail in their object, and the outlay upon them, especially the wisdom of enlarging them must be greatly questioned. From every point of view, we claim the Ship Channel is entitled to be considered as a public undertaking, the benefits of which are widely diffused, and in which the whole country shares to the same degree as in other public works undertaken by the Government, in the cheapening of transport, and the consequent additional value given to all the products of the country.

The heavy burden assumed by the Commissioners under the legislation of 1851, and the great public advantage resulting from their operations, soon became generally understood and appreciated, and after lengthened agitation, such concurrence of opinion was obtained in the public obligation to assume the outlay, that, in 1860, the Government relieved the Commissioners of further payment either of principal or interest on the existing bonds, and made advances supposed to be sufficient to complete the channel to a depth of 20 feet. The appropriations, however, proved insufficient, and besides the loss of interest and payments out of surplus revenue previous to 1860, the Harbour of Montreal contributed a capital sum exceeding \$300,000 to these works, beyond the payments assumed and made by the Government. In the agreement executed with the Commissioners by the Hon. A. T. Galt on behalf of the Government, dated 23rd May, 1860, the following statement occurs: "The works for deepening the ship channel now appertain to the Department of 'Public Works, but are to be conducted by and carried on under the direction of 'the Harbour Commissioners of Montreal."

From the completion of the 20 feet channel in 1865 till 1873, no outlay of consequence was made, but from that time under 36 Vic. cap. 60, up to 31st December 1878, a sum of \$1,120,000 has been expended, as already mentioned, the entire interest of which has been paid out of Harbour Revenue. In 1878 the payment amounted to \$46,949, and is of course constantly increasing while it now reaches a sum equal to the whole wharfage dues collected on sea-going vessels both sailing ships and steamers.

When provision is made for interest on bonds issued for improving the Harbour of Montreal, and the necessary yearly outlay for repairs, as well as expenses of management, practically nothing now remains for providing improvements absolutely required to maintain the position of the Port. The necessity for changes to meet the altering conditions of trade and improvements in the channel is constantly pressing upon the attention of the Commissioners, and an elaborate report of eminent engineers, has been made upon the subject, whose recommendations must, however, in the present position of matters, remain entirely in abeyance.

Apart from these considerations, however, the Commissioners are convinced of the necessity for reducing their tariff of charges in order that the Port of Montreal may favourably compare in expense with her rivals, New York, Boston, Philadelphia and Baltimore, without which the power to attract Western trade through Canadian routes will be destroyed, and as a matter of fact statistics show that the St. Lawrence is steadily and seriously losing ground in the proportion of this Western business it obtains, nor can this be remedied or even Canadian traffic be retained in our own channels, unless measures be taken to reduce the charges now necessarily imposed.

Under these circumstances the Commissioners deem it their duty to lay the facts before the Government, and to urge most strenuously that action be taken at once in the direction they desire, to the end that the channel improvements now being conducted by them, may now, as before, be accepted and treated as public works, and the outlay not made chargeable upon any local revenues, but form part of the general expenditure of the Dominion.

They make this application with the more confidence in view of the fact that neither for principal or interest, or even the guarantee of interest on any outlay for the construction or maintenance of the Harbour of Montreal, has any aid from the Government ever been received. The amount of outstanding bonds issued for these purposes entirely on the credit and responsibility of the Trust is \$1,729,887.

On behalf of the Harbour Commissioners.

(Signed,)

THOMAS CRAMP,

Chairman.

Harbour Commissioners' Office,
Montreal, 31st March, 1879.

HARBOUR COMMISSIONERS OF MONTREAL.

HARBOUR COMMISSIONERS' OFFICE.

MONTREAL, 1st December, 1880.

The Hon. H. L. LANGEVIN, C. B.
&c. &c.

DEAR SIR,—Feeling the importance and the urgent necessity for some action regarding the river and lake channel debt, the Board of Harbour Commissioners have prepared a memorial to His Excellency the Governor in Council on the subject which will be sent up to-morrow. I have the honour now to send you herewith two printed copies of the same, as also copies of the memorandum submitted to the Hon. Minister of Public Works by this Board in 1879.

I am requested to ask your most favourable consideration of these documents, and I confidently trust the result will be satisfactory to us.

Will you be good enough to let us know when you will be in a position to receive a deputation from this Board on the subject. The time is getting short now, but the Board had hopes that you would desire to take up the question before the meeting of Parliament.

Allow me also to ask if you have looked at the draft of the Bill sent by this Board to the Hon. Minister of Marine. Recent events on the river, added to representations by those interested in its navigation, render it necessary that the powers asked for in that Bill should be obtained, and we trust you will secure its passage the coming Session.

If you desire it a few more copies of the memorial will be sent.

With highest regards,

I remain,

Your very obedient servant,

HENRY BULMER,

Acting Chairman.

MEMORIAL.

(Reference No. 9876.)

To His Excellency the Right Honourable Sir John Douglas Sutherland Campbell
Marquis of Lorne, P.C., K.T., G.C.M.G., Governor-General of Canada, &c., &c.,
in Council assembled.

The Memorial of the Harbour Commissioners of Montreal respectfully represents,

That your memorialists feel it to be their duty to approach your Excellency in Council, with reference to the important work with the direction of which they are charged by the Government of the Dominion.

That on the 31st of March, 1879, they had the honour of submitting to members of your Excellency's Government, a memorandum (a printed copy of which is herewith enclosed), setting forth the progress that had been made since the year 1851, in deepening and enlarging the channel through Lake St. Peter, showing that since the 12th June, 1851, the channel which at that time had only an available depth of 12 feet, had been so far improved and enlarged as to have a minimum depth of 22 feet, and a minimum width of 300 feet. And that in order to attain that measure of success, your memorialists had then expended out of the loan provided for by the 35 Vic., Chap. 60, a sum of \$1,120,000, of which an outlay of about \$500,000 was represented by plant and machinery, all of which still remain on hand.

That since your memorialists submitted that memorandum they have continued the works for the improvement of the channel, and in so doing, a further sum of \$304,000 was expended upon them during the years 1879 and 1880, by means of which a large portion of the channel, has been further deepened to a minimum depth of 25 feet.

That if your memorialists are permitted to continue their operations during next season, they will be able to complete the deepening of the entire channel to the above-stated minimum depth of 25 feet, and that the expenses of so doing will not exceed the amount authorized to be raised under the Act above mentioned for the purpose of deepening the channel to a minimum depth of 22 feet at low water. The value of the plant and materials on hand being sufficient to cover the apparent excess of the total expenditure above the sum of \$1,500,000 contemplated by the said Act.

That while your memorialists do not deem it necessary to trouble your Excellency with similar observations to those contained in the said memorandum respecting the value and advantages to the country and to its trade, of the work which they have been mainly instrumental in carrying through during the last 30 years; they beg leave to refer to those observations, and to state that the further experience of two seasons confirms them in the opinion they have expressed as to the incalculable importance to the Dominion of the improvement of the great marine highway of the St. Lawrence. And they would urge upon your Excellency's consideration, the reasons given in that memorandum for regarding the expenses of that improvement as properly chargeable upon the revenues of the Dominion, rather than upon those of the harbour of Montreal.

Your memorialists desire further to observe that public attention has been forcibly attracted during the past seasons to the necessity for lightening the burthens upon shipping frequenting the harbours on the St. Lawrence accessible to sea-going vessels, and more especially the harbour of Montreal, not specially in the interest of that harbour, but of the entire trade and shipping of the Dominion, the prosperity of which depends upon establishing the charges upon shipping at rates which will compare favourably with those of the northern and central harbours of the United States. And with this view, some reduction of the existing rate of charges in the harbour of Montreal, and its approaches, has been urgently pressed both upon your memorialists and upon the public generally.

That as shown by the said memorandum the interest paid by your memorialists in 1878, upon the amount thus expended under the Act of 1873, was \$46,949, and that during the year 1879 the increased expenditure increased the amount of interest paid in that year to the sum of \$54,532.72, while the total revenue of the harbour

from ships and steamers during the summer season was only \$58,417.50, showing a margin only of \$3,884.33 out of the total receipts from sailing and steam vessels visiting the harbour, to assist in covering the maintenance of the harbour and the payment of the debt appropriate to it, now amounting to nearly \$1,800,000. And that when the returns for the recently closed season of navigation have been received, the results will be in a similar proportion to those of the season of 1879.

That from the foregoing statement of facts it is obvious that no reduction can be made upon the existing harbour dues, so long as the harbour is held liable for the interest upon the expenditure on the Lake St. Peter and river channel. And that, in fact, the expenditure of the entire appropriation will throw upon the harbour an annual payment by way of interest greater than the entire present revenue of the harbour, derived from sailing and steam vessels.

That, moreover, in order to maintain the position of the harbour of Montreal as the great terminal port for sea-going vessels, improvements and extensions of various kinds are needed, and have been recommended by eminent engineers, which it is impossible for your memorialists to contemplate making while burthened with the interest of the expenditure upon the river channel. And that such improvements are as essential to the maintenance and encouragement of the shipping trade of the St. Lawrence as the reduction of the expenses to be incurred in reaching and using ports on that river, and especially the harbour of Montreal.

That in view of the facts already stated it is impossible for your memorialists to contemplate any material improvement of the harbour or any reduction of rates, so long as they are burthened with the interest upon the expenditure made in the improvements of the channel of the River St. Lawrence; and they would respectfully urge upon your Excellency's consideration the fact that the cost of those improvements to the channel of the River St. Lawrence, are as properly and justly chargeable upon the country as the cost of the series of canals of which that great highway forms the extension. And that there is no more ground for throwing the burthen of those improvements upon the harbour of Montreal than there would be for imposing upon the localities at the termini of the various canals of the Dominion the expenses of constructing those canals.

That in the spring of the present year your memorialists again brought the said memorandum, and the facts and circumstances which had afterwards transpired, under the notice of Your Excellency's Government; and that they then had the honour of receiving from members of Your Excellency's Cabinet an assurance that Your Excellency's Government would be prepared to submit to Parliament at its next Session a scheme for the relief of the trade by the St. Lawrence route, which would include the assumption of the debt incurred for the improvement of the lake and river.

That your memorialists communicated that assurance to the public through the Board of Trade of Montreal, and by other means, and that it was received with great satisfaction.

Your memorialists, therefore, would respectfully and earnestly urge upon your Excellency in Council, that some measure be taken for the relief of your memorialists, and of the harbour of Montreal from the share of the public burthen thus unjustly imposed upon them, in order that your memorialists may avail themselves of the portion of their revenue heretofore appropriated to the payment of interest upon the cost of that public work, in order to reduce the burthens upon shipping and to complete the improvement of the harbour of Montreal as the central shipping port of the Dominion.

And your memorialists as in duty bound will ever pray.

(Signed,)

HENRY BULMER,
Acting-Chairman.

(Signed,)

H. D. WHITNEY,
Secretary.

APPENDIX No. 12.

REPORT

FROM THE

MONTREAL BOARD OF TRADE

AND

MONTREAL CORN EXCHANGE ASSOCIATION

ON

HARBOUR DUES AND TRANSIT CHARGES

AT

MONTREAL AND ATLANTIC PORTS.

APPENDIX No. 12.

HARBOUR DUES AND TRANSIT CHARGES AT MONTREAL AND ATLANTIC PORTS.

(Reference 9,342.)

LETTER FROM THE SECRETARY OF THE BOARD OF TRADE, AND THE CORN EXCHANGE ASSOCIATION.

MONTREAL, 12th November, 1880.

Hon. H. L. LANGEVIN, C. B.,
Minister of Public Works,
Ottawa.

SIR,—By instructions from the President of the Board of Trade, and the President of the Corn Exchange Association, I have the honour to transmit the joint reply of their respective Boards to your letter of 28th June, in which you were pleased to request answers to certain inquiries relating to canal tolls, harbour dues, etc. The communication is in four sections, viz:—

1. Statements relating to the carrying trade; on pages 467 to 473 inclusive.
2. Replies in detail to the inquiries contained in your letter; on pages 474 to 48 inclusive.
3. Additional information; on pages 490 to 497 inclusive.
4. Summary of conclusions; on page 498.

It is regretted that so much time has elapsed before this joint answer could be presented, but it seemed to be essential that all particulars in any way bearing upon the subject should be succinctly laid before you,—and, in doing this, much more time has been occupied than was at first anticipated.

I am now to express to you the hope that the varied information submitted may enable you, in concert with your colleague, the Minister of Railways and Canals, to present such recommendations to the Government as will secure the speedy removal of all the burdens and disabilities which prevent the expansion of Canadian commerce by the River St. Lawrence. If this should be the result of your deliberations, you will be instrumental in conferring a great boon upon the mercantile and shipping interests, as well as upon the general trade of the whole country.

I am only further to suggest that if you consider it desirable to have a few more copies of the enclosed document, to enable you to furnish one to such of the Cabinet Ministers as may, along with yourself, wish to examine the details submitted,—I am directed by the Presidents to comply with any instructions from you in the matter.

I have the honour to be, Sir,

Your obedient servant,

WM. J. PATTERSON

Secretary Board of Trade, and Corn Exchange Association.

INTRODUCTORY.

F. W. HENSHAW, Esq.,

President Board of Trade;

AND

ROBERT ESDAILE, Esq.,

President Corn Exchange Association:

GENTLEMEN,—Communications were addressed to you respectively, by the Honourable the Minister of Public Works, in which he requested sundry information, that he might “be in a position to fully enter into and discuss the question recently laid before the Federal Government by the several deputations from the East and West of Canada,—viz: the freedom, as far as practicable, of the St. Lawrence route.” The letters to you were precisely alike. The following is a copy:—

OTTAWA, 28th June, 1880.

SIR,—In order to be in a position to fully enter into and discuss the questions recently laid before the Federal Government by the several deputations from the East and West of Canada, viz:—the freedom, as far as practicable, of the St. Lawrence route, I am desirous of acquiring certain information which, I believe, the Corn Exchange Association (the Board of Trade), and other public bodies can furnish me with, the possession of which would enable me, together with my colleague, the Minister of Railways and Canals, to lay before the Privy Council such Report upon the subject as would form the basis of our discussions.

I have therefore the honour to request that you will furnish me with the following statements:

- 1st. A statement showing the comparative cost of transport *viâ* the Erie Canal and the St. Lawrence Canal.
- 2nd. The tolls charged on both routes.
- 3rd. A statement showing the comparative cost of harbour dues in Montreal, New York, Philadelphia, Boston and Baltimore.
- 4th. What reduction in dues your Board would recommend, either as to tonnage dues on vessels, or Wharfage rates on Goods, in order to successfully compete with the Ports above-mentioned?
- 5th. The comparative cost of pilotage at all the above-mentioned Ports, and what remedy your Board would propose in order to reduce the cost of this service below Quebec, as also from Quebec to Montreal.
- 6th. What remedy your Board would propose to lessen the cost of towage of sailing vessels from Father Point to Quebec and from Quebec to Montreal.

I will thank you to let me have the information above named as soon as practicable, and also to furnish any further data bearing upon this subject.

I remain, Sir,

Your most obedient servant,

HECTOR L. LANGEVIN.

It having been determined that the inquiries could be more satisfactorily made and reported upon jointly, than were your Corporations to submit separate statements, he undersigned was instructed to make investigation and submit proposed answers to the Minister's questions; presenting all particulars in the form that may be considered most explicit and useful. This I now have the honour to do; and the only apology that can be made for the delay in presenting my report, is the range of the investigation that seemed necessary, extending over long periods,—and the diversity of particulars which were considered to have a bearing upon the general question.

My aim has mainly been to collect and systematize all available information bearing, directly or indirectly, on matters referred to in the foregoing letter.

This communication has assumed dimensions which, at the outset, were not contemplated. After much condensation, the first section is but little more than a synopsis of the progress of the carrying trade of North America during the past quarter of a century. The second, embracing the replies to the Minister's inquiries, is worth examining; and it is hoped that the result of the consideration which the subject is receiving from the mercantile community and the Government, may be the adoption of a policy that will preserve the trade of Canada's Great Water Highway from being broken down, as has been that of the Erie Canal.

The inquiry, of which the matter in the following pages is the out-come, has been a tedious but congenial one; and I have only further to express my solicitude that the particulars adduced may tend to the speedy initiation of measures that will free the inland and ocean commerce of Canada from every obstructive burden.

I am, Gentlemen,
Your obedient servant,

WM. J. PATTERSON.

Secretary.

MONTREAL, 6th November, 1880.

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STATEMENTS RELATING TO THE CARRYING TRADE.

TRANSPORTATION FROM LAKE ERIE.

The table on next page shows the volume of traffic which has been flowing from the level of Lake Erie towards the sea-board during the past twenty-four years,—the quantities of vegetable food of all kinds that were carried eastward by the New York Central and Erie railroads,—the quantities of breadstuffs moved in the same direction *via* the New York Canals,—the quantities of general estward traffic by each of these routes,—and the combined aggregates of food and merchandise so transported.

A glance at the last column of that statement will show, in a general way, that the eastern current of traffic during the entire period, has been great, and steadily increasing,—the most notable exceptions being in 1875 and 1876. The railway columns indicate that, for many years by the Erie railway, and since 1869 by the New York Central, much the larger proportions of breadstuffs and general merchandise have passed from the Lake Erie region by these channels; while the Canal traffic, especially in breadstuffs, cannot be said to have been maintained at what it was years ago,—for, since 1861 and 1862, as regards flour and wheat, no year's business has equalled either of these. The immense increase in railway traffic to the sea-board through the State of New York, is all the more remarkable when it is remembered that other trunk lines have, for several years, been drawing away freight

from the Western and North-Western States to ocean ports at Philadelphia and Baltimore. Some idea of the magnitude and growth of the transportation of bread-stuffs diverted to these cities, may be formed from the table on page 472.¹

YEARS.	NEW YORK CENTRAL RAILWAY.		ERIE RAILWAY.		NEW YORK CANALS.		AGGREGATE BY RAILWAYS AND CANALS.	
	Tons of Vegetable Food.	Aggregate Tonnage.	Tons of Vegetable Food.	Aggregate Tonnage.	Tons of Wheat and Flour.	Aggregate Tonnage.	Tons of Food.	Grand Aggregate of Tonnage.
1856.....	283,027	776,112	148,943	993,321	475,385	4,116,082	906,355	5,825,41
1857.....	275,941	838,791	120,617	978,066	263,141	3,344,061	659,699	5,160,91
1858.....	301,507	765,407	154,534	816,965	454,831	3,665,192	910,872	5,237,56
1859.....	249,751	834,319	112,727	869,072	250,872	3,781,684	613,350	5,485,07
1860.....	343,872	1,028,183	197,233	1,139,554	710,138	4,650,214	1,251,243	6,817,95
1861.....	441,562	1,167,302	243,959	1,253,419	1,054,295	4,507,635	1,739,816	6,928,35
1862.....	469,885	1,387,433	261,824	1,632,955	1,177,299	5,598,785	1,909,008	8,619,17
1863.....	405,380	1,449,604	228,632	1,815,096	846,446	5,557,692	1,480,458	8,822,39
1864.....	461,511	1,557,148	215,986	2,170,798	606,891	4,852,941	1,284,388	8,580,88
1865.....	349,103	1,275,299	212,677	2,234,350	420,643	4,729,654	982,423	8,239,30
1866.....	453,663	1,602,197	397,963	3,242,792	289,166	5,775,220	1,140,792	10,620,20
1867.....	495,194	1,667,926	277,432	3,484,546	332,589	5,688,325	1,105,215	10,840,79
1868.....	568,680	1,846,599	302,451	3,908,243	390,852	6,442,225	1,261,983	12,197,06
1869.....	764,831	2,281,885	322,978	4,312,209	636,670	5,859,080	1,724,479	12,453,17
1870.....	1,297,481	4,122,000	468,976	4,852,505	575,684	6,173,769	2,342,141	15,148,27
1871.....	1,459,919	4,532,056	745,670	4,844,208	678,450	6,467,888	2,884,039	15,844,15
1872.....	1,158,894	4,393,965	711,720	5,564,274	356,917	6,673,370	2,227,531	16,631,60
1873.....	1,452,962	5,522,724	584,030	6,312,702	682,827	6,364,782	2,719,819	18,200,20
1874.....	1,678,476	6,114,678	791,265	6,364,276	726,702	5,804,588	3,196,443	18,283,54
1875.....	1,669,070	6,001,954	674,174	6,239,946	686,709	4,859,958	3,029,953	17,101,88
1876.....	2,100,339	6,803,680	775,464	5,972,818	357,683	4,172,129	3,233,486	16,948,62
1877.....	1,787,112	6,351,356	706,571	6,182,451	385,072	4,955,963	2,878,755	17,489,77
1878.....	2,628,190	7,695,413	1,067,574	6,150,568	811,908	5,171,320	4,507,672	19,017,30
1879.....	.....	.....	.....	.....	.....	.....	.....	.....

The following concise statement shows the eastward and westward traffic earnings of the New York Central and the Erie Railways, and the Canals respectively, for a period of twenty-four years,—the rates per ton per mile being also given. It appears that, though the rate by canal is 33 to 50 per cent. less than by the railways, the water route has not been able to hold its own.

YEARS.	N. Y. CENTRAL RAILWAY.		ERIE RAILWAY.		NEW YORK CANALS.	
	Amount of Freight earned.	Average rate per ton per mile.	Amount of Freight earned.	Average rate per ton per mile.	Amount of Freight and Tolls.	Average rate per ton per mile.
	\$		\$		\$	
1856	4,328,041	2.97 cents.	4,545,782	2.48 cents.	6,573,225	1.11 cents.
1857	4,559,276	3.13 "	4,097,610	2.45 "	3,876,000	7.99 mills.
1858	3,700,270	2.59 "	3,843,310	3.32 "	4,502,437	7.97 "
1859	3,337,148	2.13 "	3,195,869	2.17 "	3,665,806	6.72 "
1860	4,095,934	2.06 "	3,884,343	1.84 "	8,049,450	9.94 "
1861	4,644,449	1.96 "	4,351,464	1.73 "	9,369,378	1.08 cents.
1862	6,607,331	2.22 "	6,642,915	1.89 "	10,780,431	9.59 mills.
1863	7,498,509	2.40 "	8,432,234	2.09 "	9,065,065	8.76 "
1864	8,543,370	2.75 "	9,855,087	2.31 "	10,039,609	1.15 cents.
1865	8,776,028	3.31 "	10,726,264	2.76 "	8,695,961	1.10 "
1866	9,671,920	2.92 "	11,611,023	2.45 "	10,160,051	1.00 "
1867	9,151,750	2.53 "	11,204,689	2.04 "	8,663,119	0.90 "
1868	9,491,427	2.59 "	11,425,739	1.92 "	9,012,659	0.88 "
1869	10,457,582	2.20 "	13,046,804	1.60 "	8,492,131	0.92 "
1870	14,327,418	1.86 "	12,328,027	1.37 "	7,552,988	0.83 "
1871	14,647,580	1.65 "	13,232,235	1.47 "	10,779,887	1.02 "
1872	16,259,647	1.69 "	14,509,745	1.52 "	10,648,711	1.02 "
1873	19,616,018	1.57 "	15,015,808	1.45 "	9,267,503	0.88 "
1874	20,348,735	1.47 "	13,740,042	1.31 "	6,972,607	0.73 "
1875	17,899,702	1.27 "	12,287,400	1.21 "	4,863,137	0.66 "
1876	17,593,265	1.05 "	11,429,930	1.07 "	3,898,919	0.68 "
1877	16,424,316	1.02 "	10,647,807	0.96 "	4,839,033	0.57 "
1878	19,045,830	0.91 "	11,914,489	0.97 "	3,936,520	0.42 "
1879						

The foregoing particulars regarding the eastward movement from Lake Erie have been gathered out of the Annual Reports of the Auditor of the New York State Canals.

TRANSPORTATION FROM LAKE ONTARIO.

The following summary statement shows the aggregate of Flour and Grain which passed eastward from the level of Lake Ontario during the past eleven years. The details have appeared from time to time in the Annual Reports of the Trade and Commerce of Montreal:—

	BUSHELS.		BUSHELS.
1869.....	30,852,440	1875.....	28,582,150
1870.....	30,120,551	1876.....	27,856,724
1871.....	35,659,298	1877.....	31,324,811
1872.....	31,878,595	1878.....	29,808,195
1873.....	32,449,369	1879.....	33,963,698
1874.....	35,124,651		

The annual average movement appears to have been 31,601,853 bushels. The lowest quantity (in 1876) was 11·85 per cent. below the average; the highest (in 1871) was 12·84 per cent. above it; while the quantity in 1879 was 7·47 per cent. above the average of the period, and only 9·09 per cent. above the quantity in 1869

The following percentages show that the current of transportation from Lake Ontario to the seaboard does not nearly all flow down the River St. Lawrence :—

	Oswego.	Charlotte.	Fair Haven.	Cape Vincent.	Ogdensburg.	Montreal.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1869.....	43·42	0·27	.....	0·68	13·36	42·27
1870.....	40·77	0·37	.....	1·51	15·43	41·92
1871.....	39·64	0·29	.....	1·49	13·89	44·69
1872.....	28·83	0·60	.....	1·35	14·00	55·22
1873.....	26·34	0·24	.....	0·97	11·39	61·06
1874.....	37·02	0·30	.....	0·97	11·96	49·75
1875.....	29·48	0·67	.....	1·02	8·94	59·89
1876.....	27·57	0·54	.....	1·05	3·50	67·54
1877.....	29·23	0·12	0·39	0·74	10·91	58·61
1878.....	17·34	0·20	0·50	0·76	11·20	70·00
1879....	23·00	0·05	0·73	0·65	9·72	65·85

It appears that the movement *via* Oswego has diminished considerably,—a good deal of variation has taken place as regards Ogdensburg—while the figures for Montreal indicate an increase. During five years (1870 to 1874) the annual average for Montreal was 50·53 per cent. of the whole; while during the last half of the decade the yearly percentage was 64·38.

TRAFFIC MOVEMENT FROM BOTH LAKES.

The preceding statements show separately the movements from Lake Erie and Ontario, and how small, comparatively speaking, is the traffic of the latter;—a concise view of this transportation question has also been presented in a series of tables by the Commissioner of Inland Revenue, and presented in his Annual Report to the Dominion Government. Mr. Brunel's classification is comprehensive, and the contrasts are made clearly—confirming, from a different stand-point, the conclusion from figures derived from other sources. The following table is re-formed from his Report:—

	New York Canals.	Welland Canal.	New York Central and Erie Railways.	Cleared at Buffalo and Ton- awanda.	Cleared at Oswego.	Via Welland Canal, from U.S. to U.S. Ports.
	1	2	3	4	5	6
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1869.....	1,302,613	503,860	1,087,809	786,436	267,815	337,539
1870..... { Total	1,295,010	596,749	1,766,457	802,592	238,181	337,384
{ Increase or decrease.....	-0·58	+18·43	+62·36	+2·05	+11·06	+0·04
1871..... { Total.....	1,850,198	668,676	2,205,589	1,315,693	297,424	384,585
{ Increase or decrease.....	+42·03	+32·59	+102·75	+67·29	+11·05	+13·94
1872..... { Total.....	1,674,320	623,448	1,870,614	1,317,276	169,818	316,619
{ Increase or decrease.....	+28·53	+23·73	+71·96	+67·50	-36·59	-6·19
1873..... { Total.....	1,745,171	540,050	2,036,992	1,432,174	131,765	236,743
{ Increase or decrease.....	+33·97	+7·18	+87·25	+82·01	-50·08	-29·86
1874..... { Total.....	1,767,598	622,558	2,791,517	1,157,503	243,325	290,114
{ Increase or decrease.....	+35·96	+23·55	+156·62	+47·18	-9·14	-14·04
1875..... { Total.....	1,305,550	511,990	2,343,241	1,017,559	126,763	291,473
{ Increase or decrease.....	+0·22	+1·61	+115·04	+29·38	-52·71	-13·55
1876..... { Total.....	1,064,293	455,022	2,875,803	783,331	99,975	181,885
{ Increase or decrease.....	-18·29	-9·59	+165·40	-0·39	-62·67	-46·11
1877..... { Total.....	1,408,984	406,567	2,493,683	1,223,100	126,899	169,836
{ Increase or decrease.....	+15·07	-19·03	+129·23	+25·52	-52·61	-49·68
1878..... { Total.....	1,912,734	438,889	3,695,764	1,644,301	93,149	161,117
{ Increase or decrease.....	+46·83	-12·89	+239·74	+109·08	-65·21	-52·26
1879..... { Total.....	1,833,399	422,735	4,353,617	1,565,543	127,168	126,407
{ Increase or decrease.....	+40·74	-16·10	+300·22	+99·07	-52·51	-62·54

In the preceding table for the decade 1870 to 1879 inclusive, all the increases (+) or decreases (—) from year to year relate to the figures for 1869.

RESULTS.

1. There were only two years (1870 and 1876) during which the quantities of food-stuffs carried by the New York Canals were less than in 1869, the difference in 1870 not being worth noting; in each of the other years, with one exception, the increase was large.

2. As regards the movement by Welland Canal, there were increases during the first six years of the period, but diminutions during the last four which averaged 14.40 per cent. for each.

3. The movements eastward by the two great trunk railways in the State of

New York, show a very different result. Everyone of the ten years shows augmenting traffic; the increase in 1870 was 62·36 per cent., bounding upward year by year until in 1879 the augmentation was over 300 per cent.

4. The Canal clearances at Buffalo and Tonawanda show large increases, except in 1870 and 1876.

5. The Canal clearances at Oswego show a constant *minus* (—) difference, except in 1871.

6. Since the first two years of the decade, the quantities of breadstuffs passing through the Welland Canal, between U. S. ports, have decreased,—the diminution becoming much larger in the four years 1876 to 1879.

MOVEMENT OF BREADSTUFFS AT THE SEA-BOARD.

The tabular statement on the opposite page shows concisely the total quantities of Breadstuffs received at, and shipped from, the Atlantic sea-board, during ten years,—Flour and Meal being given in bushels:—

		Boston.	New York.	Phila- delphia.	Baltimore.	New Orleans.	Montreal.	Totals.
		Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1870...	{ Receipts	13,102,703	69,921,175	15,307,011	13,819,101	15,480,179	13,106,630	140,736,79
	{ Shipments...		29,455,814				13,601,310	
1871...	{ Receipts	15,037,943	89,543,673	20,102,425	17,389,443	14,601,922	16,808,108	173,483,51
	{ Shipments ..		43,595,502				16,186,484	
1872...	{ Receipts	17,068,086	90,930,336	24,117,150	20,571,499	15,256,805	18,115,670	186,059,54
	{ Shipments		45,901,493				17,522,957	
1873...	{ Receipts	17,926,202	92,137,971	24,949,157	19,099,517	13,214,226	19,989,094	187,316,16
	{ Shipments ...	2,145,364	54,278,072	4,807,620	9,049,545	1,433,278	17,912,572	89,626,45
1874...	{ Receipts	18,000,002	107,273,158	24,625,591	24,936,208	12,295,333	17,676,188	204,806,48
	{ Shipments ...	3,186,318	66,088,650	6,671,334	12,555,090	2,394,476	16,739,580	107,635,43
1875...	{ Receipts	18,321,063	93,895,082	28,195,330	22,048,569	9,669,296	17,324,137	189,453,47
	{ Shipments ..	3,987,959	50,686,401	8,846,515	11,407,489	774,927	15,363,184	91,066,47
1876...	{ Receipts	22,753,698	95,949,252	35,546,845	35,310,276	9,544,194	19,086,600	218,190,86
	{ Shipments ..	6,043,298	55,500,158	22,016,515	24,761,307	2,145,818	18,167,642	128,634,73
1877...	{ Receipts	23,215,457	103,313,782	25,727,260	34,590,303	10,025,381	18,825,184	215,697,36
	{ Shipments ..	5,974,621	62,418,317	13,473,965	25,842,450	3,101,232	17,346,678	128,157,26
1878...	{ Receipts	27,291,781	152,862,170	45,474,650	47,075,240	14,529,304	21,934,170	309,167,31
	{ Shipments ..	12,941,359	107,819,044	29,876,327	39,724,954	7,606,427	20,899,187	218,867,29
1879...	{ Receipts	32,798,829	163,124,890	47,398,455	66,799,926	14,895,836	23,192,749	348,210,68
	{ Shipments....	15,774,076	124,350,932	32,310,473	55,629,594	7,065,416	22,755,946	257,886,43
*1880...	{ Receipts	24,821,240	124,879,001	37,253,615	43,974,977	18,311,647	19,137,515	268,377,99
	{ Shipments...	16,243,017	105,608,677	25,621,840	39,832,684	11,753,340	20,309,822	219,369,38

RESULTS AS REGARDS MONTREAL.

A close examination of the figures in the column for Montreal, will show an increase of receipts in 1879 of 5·74 per cent. over 1878, the latter year indicating 16·51 per cent. over 1877. The increase of shipments in 1879 over 1878 was 17·1

per cent.,—the increase in the latter year over 1877 being 15.61 per cent. Notwithstanding this local increase, the augmented movement along the sea-board shows that there had been a steady relative decrease for a number of years, until the present season, when there appears, so far, to be a small increase. The table gives the following results:—

	Receipts.	Shipments.
In 1870, Montreal's proportions were	9.31 per cent.	.....
1871, " "	9.69 "	. ....
1872, " "	9.73 "	.....
1873, " "	10.67 "	19.98 per cent.
1874, " "	8.63 "	15.55 "
1875, " "	9.14 "	16.87 "
1876, " "	8.75 "	14.12 "
1877, " "	8.72 "	13.53 "
1878, " "	7.09 "	9.54 "
1879, " "	6.66 "	8.82 "
* 1880, " "	7.13 "	9.26 "

The figures for 1880, to which an asterisk (*) is prefixed, in the foregoing table, only include the receipts and shipments at the several ports for the first nine months of the year. They are not from official sources; but have been so carefully collated as to warrant the belief that they afford a fair approximate statement for general comparison. A small increase in the percentages of receipts and shipments is shown. It is believed that, had the tenth month's business for all the ports been included in the table on page 472, the percentages for Montreal would have been decreased; because the receipts and shipments during October, at this port, for the past and present years, show the following unfavourable contrast:—

	1879.	1880.	Decrease.
Receipts, bushels.....	3,976,126	3,321,402	654,724
Shipments, "	3,671,150	3,230,961	440,189

INFERENCES FROM THE FOREGOING STATEMENTS.

1st. The current of traffic, say, of grain for Great Britain, appears to flow increasingly eastward without regard (1) to distance, and preferring the longest route; (2) this preference being against the cheaper mode of transport by the Welland Canal and River St. Lawrence; and (3) a fair inference is (as shown on p. 469), that railway transport is now much less expensive than it was twenty or thirty years ago. To enable carriers by water, therefore, to maintain a fair relative position, every impediment must be removed, and every item of expense reduced.

2nd. The information tabulated in one of the statements (p. 471) shows, that the great reductions in canal freights and tolls, from time to time, during the past quarter of a century, have not sufficed to increase, or even to maintain the volume of traffic by the water route.

3rd. The re-imposition of full rates of toll upon merchandise passing through the Canadian Canals in 1863,—(that is to say, the Order-in-Council dated 19th May, 1860, which provided for a refund of 90 per cent. of the tolls in certain cases, at Port Colborne, was rescinded before the opening of navigation in 1863)—did not lead, for instance, to an increase in the average rate of freight on wheat from Chicago to Montreal,—reductions being made *pari passu* both by the Welland and the Erie.

4th. The opinion is entertained in Toledo, that the "cheapest route from thence to Liverpool, *via* Montreal, has additional advantages over the extra charges in Buffalo and New York for transfer, and is a great protection to western shippers." When the enlargement of the Welland Canal is finished, and the removal or reduction of all encumbering tolls and charges is accomplished, the advantages referred to

may be realized. Meantime, that opinion seems to be practically confined to those who give expression to it, as may be inferred from the table and remarks on page 11.

5th. Whatever means may be adopted with a view to increase the export and import trade of the Dominion, *via* the River St. Lawrence, it would seem scarcely worth while to consider what effect, if any, would be produced by that action upon east-bound freight from the Western States, other than that in which Canadians may have a direct interest.

6th. The railway from Fort William, on Lake Superior, to Winnipeg and Selkirk—as well as 150 miles of the main line of the Canada Pacific, to the westward of the latter point,—will be completed before autumn, 1881, and there is no good reason to doubt that the surplus grain-crop of Manitoba will find its way by railway, and thence *via* the Welland Canal and the River St. Lawrence to Montreal,—if not driven away by high rates of freight and other charges. This alone ought to be sufficient incentive to endeavour to lessen or entirely remove all the rates and dues that can be so dealt with.

REPLIES TO THE INQUIRIES OF THE MINISTER OF PUBLIC WORKS

I. AND II.—RATES OF FREIGHT AND CANAL TOLLS.

1st. A statement showing the comparative cost of transport *via* the Erie Canal and the St. Lawrence Canals.

2nd. The tolls charged on both routes.

Years.	Chicago to New York, via Buffalo.				Chicago to New York, via Oswego.			Chicago to Montreal, by Schooner to Kingston.
	Number of days in Canal.	Highest rate, Chicago- go to Buffalo.	Highest rate, Buffalo to New York.	Average rate of freight.	Highest rate, Chicago- go to Oswego.	Highest rate, Oswego to New York.	Average rate of freight.	Through Rates
		Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
1861.....	8½	26	30	27½	30½	22	27	.....
1862.....	8½	17	24½	26½	22½	18	26½	26
1863.....	9	12½	25	23	17	18	22½	16
1864.....	10	18	22	28½	24	18	28½	18½
1865.....	10	19	26	26½	27	18	27½	18½
1866.....	10	23	23	30½	30	20	31½	18½
1867.....	10	15	25	22½	18½	17	22½	17½
1868.....	10	13½	24	23	16	17	23	17½
1869.....	10	12	25	23	16½	20	23½	16
1870.....	10	10	16	17	15	12	18½	16
1871.....	11	18	17	20½	20	14	21½	14½
1872.....	11	18	17	24½	20	14	23½	21½
1873.....	11	13	13	19	20	9	22	18½
1874.....	11	6½	11½	14	11½	7½	15	12½
1875.....	11	6½	11	11½	10	9½	12½	11
1876.....	11	5	10	9½	7½	9	11½	10
1877.....	11	6	12	11	10	13	13½	10
1878.....	10	5½	8½	9	8½	7½	13	8½
1879.....								8

Rates by propellers are variable, according to the state of trade—sometimes higher than by schooner to Kingston, and sometimes lower. On the average there is probably no difference.

Rates by propellers are variable, according to the state of trade—sometimes higher than by schooner to Kingston, and sometimes lower. On the average there is probably no difference.

The foregoing table shows the average of the rates of freight in each year since 1861; (1) from Chicago to New York *via* Buffalo and Erie Canal; (2) from Chicago to New York *via* Oswego; and (3) from Chicago to Montreal *via* Kingston. The columns showing highest rates by the U.S. water routes are worthy of examination—especially during the earlier years of the period; while the average rates by the three routes has been largely in favour of that *via* the river St. Lawrence, until within the past few years. It scarcely needs to be stated, however, that, while average rates for periods of years are *convenient* criteria, they do not always afford sufficient data for conclusions regarding particular seasons. It would be impossible to go into more detail here, however. The average time of the trip of a grain-laden propeller from Chicago to Montreal is less than is occupied by a loaded canal boat in passing through the Erie Canal.

The rates of freight averaged in the table on page 474 include the canal tolls—transfer charges at Kingston being also included in the rates to Montreal. The full toll per ton of 2,000 lbs., on wheat passing down the Welland Canal, is 20c., or say 5c. per bushel of 60 lbs. When this rate is paid, the cargo is entitled to pass *free* through the St. Lawrence Canals. This has been the tariff rate for more than twenty years—except when by Order-in-Council of 19th May, 1860, a refund of 90 per cent., in certain cases, was directed to be made at Port Colborne, and free traffic was provided for on the St. Lawrence Canals. The Order-in-Council was revoked in 1863, as stated on p. 473.

The rates by the Erie Canal on a bushel of wheat transported from Buffalo to Troy, in each season of navigation during nineteen years, were as follows:—

	FREIGHT AND TOLLS.			TOLLS ALONE WERE,				FREIGHT AND TOLLS.			TOLLS ALONE WERE.		
	c.	m.	f.	c.	m.	f.		c.	m.	f.	c.	m.	f.
1861.....	15	7	5	5	1	7	1871.....	12	6	2	2	1	0
1862.....	15	8	4	6	2	1	1872.....	13	1	0	3	1	0
1863.....	15	3	9	6	2	1	1873.....	11	5	7	3	1	0
1864.....	18	7	8	6	2	1	1874.....	10	1	1	3	1	0
1865.....	16	8	4	6	2	1	1875.....	8	0	1	2	0	7
1866.....	16	9	6	6	2	1	1876.....	6	7	1	2	0	7
1867.....	15	6	9	6	2	1	1877.....	7	3	9	1	0	3
1868.....	15	6	5	6	2	1	1878.....	5	9	9	1	0	3
1869.....	16	3	1	6	2	1	1879.....	.....	.....	.....	1	0	3
1870.....	11	2	2	3	1	0	1880.....	.....	.....	.....	1	0	3

No tolls are levied on any of the following articles when transported on the New York Canals:—

* Pork.	* Wool.	Hops.
* Beef.	* Live cattle, hogs and sheep.	Domestic spirits.
* Bacon.	Cotton.	Oil Cake.
* Cheese.	Tobacco unmanufactured.	Bar and pig lead.
* Butter.	Hemp.	Domestic woollens.
* Lard.	Clover and grass seed.	“ cottons.
* Tallow.	Flax seed.	Coffee.

The rate of toll that would be levied on the articles to which an asterisk (*) is prefixed, on passing *each way* through the Welland Canal, is 20c. per ton; the rate upon the others is 40c. per ton.

III.—HARBOUR DUES AND OTHER CHARGES.

3rd. A statement showing the comparative cost of Harbour Dues in Montreal, New York, Philadelphia, Boston and Baltimore.

It may be stated here, that the Council of the Board of Trade had the questions of Pilotage, Towing and Harbour Charges, under consideration more than a year ago; and a report was made which contained an approximate comparative statement of charges to a vessel of 600 tons register, drawing 18 feet water, inwards and outwards, as follows:

	PILOTAGE.	TOWAGE.	WHARFAGE.
Boston.....	\$ 86 37	\$ 60 00	.....
New York.....	172 80	100 00	{ \$6 per day
Philadelphia....	162 00	120 00	and fee of \$9.
Baltimore.....	162 00	150 00	\$3 per day.
Montreal.....	193 50	\$450 @ \$600	\$1 per day.
			\$4.50 per day.

Foreign ships pay a yearly tax of 30c. per ton register in the United States ports.

This general statement was necessarily partial, for the column of "Wharfage" does not include ordinary charges to which all vessels are liable, owing to the difficulty that was experienced in obtaining details. The particulars given on pp. 476 to 483 inclusive, admit of very much fuller and specific comparisons.

As supplementary to the taxes and dues levied at the ports referred to by the MINISTER OF PUBLIC WORKS the subjoined list shows the various items of charge exacted by the Federal Government upon all vessels engaged in the foreign trade or entering or leaving United States ports—as provided for by the Customs and Navigation Laws.

U. S. CHARGES ON VESSELS INWARD.

Tonnage duties on Vessels, in the foreign trade, built in the U. S., per ton register.....	\$.30
Tonnage duties on Foreign Vessels, per ton register.....	.50
Tonnage tax (besides the duty, in certain cases,) per ton register.....	.30
Light-money, per ton register.....	.50
Entry fee at Custom House, when cargo is free goods.....	2.50
" " " when cargo contains dutiable goods.....	5.50
General Order.....	.20
Each Jurat.....	.20
Permits. To land Chronometer, Sails, &c.....	.20
United States Hospital Money. Charged on American Vessels for each employé on board for their time of service since date of last entry of vessel in a U.S. port—per month..	.30
Post Entry.....	2.00
U. S. Commissioner's fees for paying crew, per man.....	.50

U. S. CHARGES ON VESSELS OUTWARD.

U. S. Commissioner's fees for shipping crew, per man.....	\$2.00
Charge for log-book and papers.....	3.00
Clearance from Custom House.....	2.50
Bill of Health.....	.20
Crew Bond.....	.40
Crew List certified.....	.25
Shipping Articles.....	.20

EXTRACTS FROM U. S. NAVIGATION LAWS.

A communication recently received from the Assistant-Secretary of the Treasury of the United States, affords the following particulars from the Navigation Laws, on the subject of "Tonnage Duties," which are worth recording here:—

SEC. 4219.—Upon vessels which shall be entered in the United States from any foreign port or place, there shall be paid duties as follows:—

- (a.) On vessels built within the United States but belonging wholly or in part to subjects of foreign powers, at the rate of thirty cents per ton.
- (b.) On other vessels not of the United States, at the rate of fifty cents per ton.
- (c.) Upon every vessel not of the United States, which shall be entered in one district from another district, having on board goods, wares, or merchandise, taken in one district to be delivered in another district, duties shall be paid at the rate of fifty cents per ton. Nothing in this section shall be deemed in anywise to impair any rights or privileges which have been or may be acquired by any foreign nation, under the laws and treaties of the United States relative to the duty of tonnage on vessels.
- (d.) On all foreign vessels which shall be entered in the United States from any foreign port or place, to and with which vessels of the United States are not ordinarily permitted to enter and trade, there shall be paid a duty at the rate of two dollars per ton; and none of the duties on tonnage above-mentioned shall be levied on the vessels of any foreign nation if the President of the United States shall be satisfied that the discriminating or countervailing duties of such foreign nations, so far as they operate to the disadvantage of the United States, have been abolished.
- (e.) In addition to the tonnage-duty above imposed, there shall be paid a tax, at the rate of thirty cents per ton, on vessels which shall be entered at any Custom House within the United States from any foreign port or place; and any rights or privileges acquired by any foreign nation under the laws and treaties of the United States relative to the duty of tonnage on vessels shall not be impaired.
- (f.) And any vessel, any officer of which shall not be a citizen of the United States shall pay a tax of fifty cents per ton. (See § 4131.)

SEC. 4220.—No vessel belonging to any citizen of the United States, trading from one port within the United States to another port within the United States, or employed in the bank, whale, or other fisheries, shall be subject to tonnage tax or duty, if such vessel be licensed, registered or enrolled.

SEC. 4221.—In cases of vessels making regular daily trips between any port of the United States and any port of the Dominion of Canada, wholly upon interior waters not navigable to the ocean, no tonnage or clearance fees shall be charged against such vessel by the officers of the United States, except upon the first clearing of such vessel in each year.

SEC. 2793.—Enrolled or licensed vessels engaged in the foreign and coasting trade on the northern, north-eastern and north-western frontiers of the United States, departing from or arriving at a port in one district to or from a port in another district, and also touching at intermediate foreign ports shall not thereby become liable to the payment of entry and clearance fees, or tonnage tax, as if from or to foreign ports: but such vessels shall, notwithstanding, be required to enter and clear.

SEC. 4223.—The tonnage duty imposed on all vessels engaged in foreign commerce shall be levied but once within one year, and, when paid by such vessel, no further tonnage tax shall be collected within one year from the date of such payment. But this provision shall not extend to foreign vessels entered in the United States from any foreign port, to and with which vessels of the United States are not ordinarily permitted to enter and trade.

SEC. 4224.—Vessels which pay tonnage duties once in a year, shall pay the same either at their first clearance from or entry at, according to priority, a Custom House in the United States in each calendar year. Nothing in this section shall be construed to prevent Customs officers from collecting such tonnage duty at the entry of

vessels at their respective Custom Houses during the calendar year if the same has not previously been paid for such year.

SEC. 4225.—A duty of fifty cents per ton, to be denominated "light-money," shall be levied and collected on all vessels not of the United States, which may enter the ports of the United States. Such light-money shall be levied and collected in the same manner and under the same regulations as the tonnage duties.

SEC. 4226.—The preceding section shall not be deemed to operate upon unregistered vessels, owned by citizens of the United States, and carrying a sea-letter, or other regular document, issued from a Custom House of the United States, proving the vessel to be American property.

Vessels entering from a foreign port or place.—I.—All merchant vessels entered in the United States from any foreign port or place, are subject to the payment of tonnage duty. They may be divided into two principal classes, namely:—Vessels of the United States, and vessels not of the United States. Vessels of the United States are those documented according to law. They pay thirty cents per ton under paragraph e, § 4219, except those any of whose officers are not citizens of the United States, which pay fifty cents per ton under paragraph f. The officers of a vessel are under the rulings of the Department, the master and mates, and, in addition, the engineers and pilots, if a steam-vessel.

II.—Vessels not of the United States may be divided, in relation to the rates of tonnage duty, into five classes:—

1. Vessels built in the United States, but belonging wholly or in part to subjects of foreign powers.

2. Vessels not built in the United States, and belonging wholly or in part to subjects of foreign powers.

3. Vessels wherever built, owned in whole or in part by subjects of foreign powers, which enter from a foreign place where vessels of the United States are not ordinarily permitted to enter and trade.

4. Vessels not built in the United States, but belonging to citizens of the United States, and provided only with a sea-letter, or other Custom House document, proving the vessel to be American property.

5. Vessels without documents.

III.—Vessels of class 1 pay 30 cents per ton under paragraph a, § 4219, 30 cents per ton additional under paragraph e, and 50 cents per ton "light-money" under § 4225 making \$1.10 in all.

Vessels of class 2 pay 50 cents per ton under paragraph b, 30 cents per ton additional under paragraph e, and 50 cents per ton "light-money" under § 4225 making \$1.30 in all.

Vessels of class 3 pay \$2 per ton under paragraph d, 30 cents per ton additional under paragraph e, and 50 cents per ton "light-money" under § 4225, making \$2.80 in all.

Vessels of class 4 pay 50 cents per ton under paragraph b, and 30 cents per ton additional under paragraph e, making 80 cents per ton; and if the owner or master refuses to take the oath required by § 4226, 50 cents per ton "light-money," under § 4225 must be paid, making \$1.30 per ton.

Vessels of class 5 pay the same as vessels of class 1 or 2, accordingly as they are vessels built in the United States or not. The collector must satisfy himself, by evidence presented, that the vessel was built in the United States, before admitting her to payment under class 1 at \$1.10 per ton. (No importations can be permitted in vessels of class 5. See § 2597, Rev. Stat.)

1.—PORT OF BOSTON.

The following are the rates and dues levied on sea-going vessels at this port:—

Customs Entry—100 tons and over, dutiable cargo.....	\$5 50
“ “ free cargo	3 17
Custom clearance—under license.....	0 50
under register.....	1 50
foreign vessel coastwise.....	2 00
“ foreign.....	3 30

With reference to the foregoing particulars from local sources, see the list of U. S. Government charges upon foreign vessels, as well as upon American vessels in the foreign trade, on pages 477, 478.

Wharfage, Dockage—Vessels discharging cargo, or loading grain at elevators, or other cargoes at the wharves, are free from wharfage.

Steamers, 1c. per day per ton register.

Sailing vessels over 200 tons register, $\frac{1}{2}$ c. per ton per day.

Lay-Days free from dockage as follows:—

Loading.		Discharging.	
200 to 500 tons.....	20 days.	200 to 500 tons.....	7 days
500 to 800 ".....	25 "	500 to 800 ".....	10 "
800 to 1100 ".....	35 "	800 to 1100 ".....	15 "
1100 to 1500 ".....	40 "	1100 to 1500 ".....	20 "
Over 1500 ".....	45 "	Over 1500 ".....	25 "

NOTE.—The foregoing information is from an "Index to the Port of Boston." Some explanations and further information have been received from a reliable source as follows:—

Wharfage.—No charge for wharfage is made to the vessel;—the shipper or receiver pays it. When a vessel goes to a railroad dock to discharge, the wharfage is free on that portion of the cargo which goes over the road;—and the same rule applies to a vessel loading at a railroad dock; that portion of her cargo which comes over the road is free from wharfage. In all cases where cargo is received from, or delivered to lighter or other vessel over side, while the vessel is at a wharf, the goods so received or delivered are subject to half-wharfage.

Particular Rates.—When the goods do not come over a railroad, to its dock where the vessel is loading, the charges on principal articles are as follows:—

Flour per brl.....	4c.	Butter, per tub.....	1c.
" per sack.....	2c.	Hay, per ton.....	40c.
Cheese, per box.....	1c.	Cattle feed, per bag.....	2c.
Lard, per tierce.....	7c.	Cattle, per head.....	15c.
Bacon, per box.....	6 $\frac{1}{2}$ c.	Sheep or Hogs, per head.	4c.

N.B.—Cattle, Sheep and Live Stock are invariably subject to wharfage, whether coming over the railway or not.

Grain-Transfer and other Charges.

Grain in bulk, delivered by floating elevator, $\frac{3}{4}$ c. to 1 $\frac{1}{4}$ c. per bushel.

" " loading and trimming, per 1,000 bush.. \$1 50 to \$2.

Hire of bags (to be returned to port), each..... 05

Stowing and sewing bags, each..... 01 $\frac{1}{2}$


Ceiling (Lining) for cargo, 1 $\frac{1}{4}$ c. per bush.; should serve for 3, 4, or 5 voyages.

Surveyor's fee..... \$10 00

2.—PORT OF NEW YORK.

The following rates and dues are paid by all sea-going vessels:—

Quarantine Dues.....	\$6 50
Hospital Dues—for Captain.....	1 50
for each Mate.....	1 00
for each Seaman.....	50
Health Officer	6 50

 With reference to the foregoing particulars from local sources, see the list of U. S. Government charges upon foreign vessels, as well as upon American vessels in the foreign trade, on pages 477, 478.

Wharfage—All vessels of 200 tons and under, per ton... 2c. per day.	
All vessels over 200 tons, 2c. per day for each of the first 200 tons; and for each additional ton $\frac{1}{2}$ c. per day.	
The owner, or lessee of a wharf may charge 5c. per ton per day, for all merchandise left on his wharf, after 24 hours have elapsed from the time of being landed or left there.	
Harbour Master's Fee, from \$3 to \$24, according to size of vessel, —the legal charge being $1\frac{1}{2}$ c. per ton.	
Ballast—discharging	35c. per ton.
Loading, stone, f. o. b.....	60c. “
“ shingle, f. o. b.....	65c. “
“ earth, f. o. b.....	50c. “


Grain-Transfer and other Charges.

Elevating—into single-deck vessels, including trimming, per 1,000 bushels.....	\$7 00
into double-deck vessels, including trimming, per 1,000 bushels	8 00
Delivering in bags on ocean vessels, per 1,000 bushels	6 25
“ “ coastwise vessels including trimming.	2 50
Loading bags, per 1,000 bushels.....	5 00
Hire of bags (to be returned to port), per 100 bags.....	4 00
Ceiling (Lining) for Grain in bulk, per 100 bushels	75

3.—PORT OF PHILADELPHIA.

The charges paid by all sea-going vessels are as follows:—

Entrance Fee.....	\$2 50	Clearance Fee	\$2 50
Harbor Master.....	2 00	Bill of Health	20
Surveyor's Fee.....	3 00	Certified Manifest.....	20
Manifest Stamp... \$1 to	2 00		

 With reference to the foregoing particulars from local sources, see the list of U. S. Government charges upon foreign vessels, as well as upon American vessels in the foreign trade, on pages 477, 478.

Wharfage Dues on a Ship. - - - - -	\$4.00 per day.
“ on a Barque, Brig, or Schooner. - - - - -	3.00 “

While, in a general way, these rates are correct, the following items are more specific:—Charges at the city wharves, from \$2 to \$5 per day; at the oil piers, \$3.50 per day for vessels under 300 tons; \$4.50 on vessels between 300 and 500 tons; \$5.50

on vessels between 500 and 800 tons; \$6.50 on vessels between 800 and 1,000 tons; and \$7 for vessels of over 1,000 tons. Rates at grain-loading wharves do not exceed \$2 per day,—at some wharves free.

Spanish, Portuguese, Italian, Russian, and South American Ships pay a sum of \$2.50 in addition to charges for Pilotage.

Stone ballast—\$1.00 to \$1.50 per ton.

Grain-Transfer and other Charges.

Loading Grain in bulk, per 1,000 bushels.	- - -	\$2.40
" in bags, " " " " " " " "	- - -	5.60
Hire of bags, (to be returned to port,) per 100 bags.	- - -	3.00
Ceiling (Lining) for bulk grain, $\frac{3}{4}$ c. to 1c. per bushel.	- - -	
Surveyor's Fee.	- - -	10.00

4.—PORT OF BALTIMORE.

The following rates are levied on all sea-going vessels:—

Vessels with dutiable cargo pay as follows:—

Customs Entry.	- - -	\$2.50
" Survey.	- - -	3.00
" Permits.	- - -	.20

Vessels with duty-free cargo pay:—

Customs Entry.	- - -	\$2.50
" Survey.	- - -	67

With reference to the foregoing particulars from local sources, see the list of U.S. Government charges upon foreign vessels, as well as upon American vessels in the foreign trade, on pages 477, 478.

Quarantine and Doctor's fees—1c. per ton register.

Wharfage per day:—Vessels of less than 400 tons.	- - -	\$1.25
400 to 600 tons.	- - -	1.50
600 to 800 tons.	- - -	1.75
800 tons and upwards.	- - -	2.00

These rates apply to wharves owned or leased by individuals, where cargoes of all descriptions are landed and shipped: At wharves owned by the City or State, the rate is 1c. per ton register per day; at the grain elevator, \$1.50 per day for vessels up to 500 tons register, and \$2 if larger; at oil wharves, \$3.50 per day on all vessels irrespective of size.

Ballast:—Discharging, per ton.	- - -	20c. to 30c.
Loading and cost of earth or stone, per ton.	- - -	50c. to 70c.

Grain-Transfer and other Charges.

Elevating bulk grain, per 100 bushels.	- - -	\$.38
Trimming " per 1,000 bushels.	- - -	1.50
Stowing bags per 1,000 bushels.	- - -	.05
Bag-hire (bags to be returned to port), per 100.	- - -	3.00
Sewing bags, per 100.	- - -	.50
Ceiling (Lining) for Grain in bulk, $1\frac{1}{2}$ c. per bushel; the same lining, with slight repairs, should serve for four or five voyages.	- - -	
Surveyor's Fee.	- - -	10.00

Storage of Grain cargoes— $\frac{1}{4}$ c. per bush. for first five days.
 $\frac{1}{4}$ c. per bush. for each of next three terms of five days each respectively.
 $\frac{1}{4}$ c. per bush. for each succeeding term of 10 days.
 Winter rate for the season (Nov. 1 to May 15) $2\frac{1}{2}$ c. per bush.

Charges for Lining (Ceiling) for Grain-cargoes:—

Wooden ships, per register ton.....45 to 60c.
 Iron ships, which are not lined higher than the turn of the bilge, per ton.....30 to 40c.
 The same lining, with occasional slight repairs, should serve for three or four voyages.
 Steamers with water ballast tanks, when tank covers are clear, dry and caulked, require no lining.
 Port Warden's Fee..... \$4 to \$6

Special Rates and Charges, 1880.

Harbour Towsages—For one tug..... \$5 to \$10
 For two tugs..... \$20
 Ballast—Wharfage on.....10c. per ton
 Carting away.....20c. "
 Laid down alongside, when required.....50c. "
 Tallyman, when required.....\$2.00 per day of 10 hours.
 Watchman, ".....\$2.00 for 12 hours.
 Customs Officer—overtime when discharging, \$2.50 per night.
 Shipping-Master's Fee, for British Vessels, for each man shipped or discharged..... 50 cents.
 Noting Protest, \$1.00:—Extending Protest, when required \$5.00
 Stevedore's charges for discharging inwards, and loading outwards cargoes, are from 16c. to 20c. per ton, for both weight and measurement.

IV.—REPEAL AND REDUCTION OF HARBOUR DUES.

h. What reduction in Dues your Board would recommend, either as to Tonnage Dues on Vessels, or Wharfage rates on Goods, in order to successfully compete with the Ports above-mentioned?

1. Through rates of freight for merchandise, for instance, from Great Britain to Toronto and other points in Ontario, are practically the same, whether the ocean carriage terminates at New York, Boston, or Montreal. There are no wharfage rates imposed at either of the two former ports, or merchandise in transit for inland points either in the United States or Canada. Wharfage rates at Montreal, however, are a considerable item. Taking the keenness of competition in every department of mercantile life into account, it is thought that an effectual remedy would be, to have all these rates promptly repealed, for they weigh heavily on the foreign commerce of the Dominion, and send freight past Canadian ships and steamers into round-about foreign channels, to find cheaper access to cities and towns in Ontario.

2. The following statement shows the operation of the tariff which the Montreal Harbour Commissioners were, in April last, authorized to enforce (see page 842); and it demonstrates the necessity for reducing the dues:—

	1878.	1879.	1880 To 1st October
<i>Sea-going Traffic.</i>	\$	\$	\$
Wharfage dues on imports.....	59,216	84,207	91,200
do exports.....		67,644	57,500
do steamships.....	103,046	41,975	54,800
do sailing vessels.....		16,442	
	162,262	210,268	203,500
<i>Local Traffic.</i>			
Wharfage dues on goods.....	8,190	6,648	
do barges.....	18,497	17,625	30,514
do steamboats, &c.....	25,473	22,891	
	52,160	47,164	30,514
	162,262	210,268	203,500
Yearly totals.....	214,422	257,432	234,014

The harbour revenue in 1879 amounted to \$269,596;—the dues levied on imports and exported merchandise, appear to have been 56·52 per cent. of that income. the dues on the steamships and sailing vessels carrying the goods were added, the burden imposed would be about 66 per cent. The effect would simply be, the addition of about \$180,000 to the cost of the property carried to and from the port of Montreal,—which would have been saved in the ports of Boston, New York, Philadelphia and Baltimore.

3. The subjoined statement shows how wharfage charges affect steamships and sailing vessels in the several Atlantic Ports, as compared with Montreal, according to the rates cited on pages 478 to 481, and 482,—the example being that of a 1,500-ton vessel.

	Steamships.	Sailing Vessels.
* Boston.....per day	\$15.00.....	\$ 7.50
New York “	10.50.....	10.50
Philadelphia, “	4.00.....	4.00
† Baltimore.. “	2.00.....	2.00
Montreal .. “	22.50.....	11.25

4. It is understood that, during the past ten years, the revenue from foreign traffic averaged 74·37 per cent. of the total revenue—the expenditure on harbour works in ten years being about \$80,000 less than was spent in seven years upon works on the river. The amount paid as interest on the Government loan in four years was not much under \$200,000, and on the harbour debt in ten years \$840,000. The revenue in ten years, from wharfage dues on sea-going vessels was \$1,738,600;—if the Harbour Trust were immediately relieved by Government, and by the City of Montreal, from debt obligations, an immense reduction (say 75 per cent.) in wharfage dues might signalize the opening of navigation in 1881.

*For some exceptions to the rule in Boston harbour, see page 479, under the word “Wharfage.”
†For exceptions, see paragraph near the foot of page 481.

5. It will be observed that this suggested reduction does not affect revenue from local sources; such would very likely be increased by the influx of sea-going vessels. In that case, the Harbour Trust could give attention to other reductions and economies which would soon make Montreal the cheapest port in the world for the sea-going craft of all nations.

V.—RATES OF PILOTAGE.

5th. The comparative cost of Pilotage at all the above mentioned Ports, and what remedy your Board would propose in order to reduce the cost of this service below Quebec, as also from Quebec to Montreal.

1.—PORT OF BOSTON.

The rates for piloting a 600-ton sailing vessel, drawing 18 feet water, from Boston Light (distance 9 miles from Boston proper) are:—

Inward, \$3.80 per foot draft.....	\$68 40
Outward, \$2.75 “ “	49 50.
	<hr/>
	\$117 90

Pilotage is practically compulsory, both for steam and sail vessels;—they generally lay to and wait for a Pilot, rather than incur risk without one. If a vessel boarded 15, 20 or even 25 miles outside of Boston Light, in summer, (say April to November), the Pilot is entitled to no more than if he had been taken within 100 yards of it. In winter he is entitled to distance-money, but must go on board four miles beyond Minot's Light, which is nine miles further out than Boston Light,—the total distance being 22 miles. The distance-money for 18 feet draft would be \$13.68, making the winter rate \$131.58.

All U. S. vessels, regardless of size, are exempted from the necessity to engage a Pilot when under coasting license. Vessels under 200 tons register when sailing under a register, may decline the services of a Pilot, and pay half pilotage.

2.—PORT OF NEW YORK.

The charges for piloting a 600-ton sailing vessel drawing 18 feet water from Sandy-Hook to New York (a distance of 21 miles) are:—

Inward, \$5.50 per foot draft.....	\$99 00
Outward, \$4.10 “ “	73 80
	<hr/>
	\$172 80

The distance from the Battery, (the southern point of the city,) to the bar, and over it, at Sandy-Hook, is 21 miles. When the wind is fair, Pilots usually leave the vessel when well over the bar; if the wind is ahead, they take the vessel to the light-p, which is 6 miles farther.

The sum of \$4 is added to the rates inward and outward respectively, between November and 1st April.

Pilotage is compulsory for all foreign vessels; but the Act regulating the service provides that “no master of a vessel belonging to a citizen of the United States, and licensed and employed in the carrying trade by way of Sandy-Hook, shall be required to employ a licensed Pilot.”

3.—PORT OF PHILADELPHIA.

The cost of pilotage from Philadelphia to the Capes of the Delaware (103 miles for a 600-ton sailing vessel drawing 18 feet water, would be:—

Inward, \$4.50 per foot draft.....	\$81 00
Outward, same rate	81 00
	<hr/>
	\$162 00

Pilotage is compulsory for all vessels arriving from, or bound to, a foreign port Spanish, Portuguese, Italian, Russian, and South American ships have to pay \$2.50 in addition to the usual cost of pilotage.

4.—PORT OF BALTIMORE.

The pilotage distance to Cape Henry is 177 miles. The charges to a 600-ton sailing vessel, drawing 18 feet water, are:—

Inward, \$5 per foot draft.....	\$90 00
Outward, same rate,	90 00
	<hr/>
	\$180 00

If a vessel is hailed outside the limit at the Cape, she must take a Pilot; but inside on being hailed, it is optional with the master to do so or not.

Coasting vessels pay a yearly tax of 6c. per ton, and are exempt from Pilotage.

5.—PORT OF MONTREAL.

The pilotage charges to a 600-ton sailing vessel, drawing 18 feet water, when towed, are as follows:—

Father Point to Quebec, 161 miles, \$3.60 per foot ..	\$64 80
Quebec to Father Point,—\$3.15 per foot.....	56 70
	<hr/>
	\$121 50
Quebec to Montreal, 150 miles, \$2 per foot.....	\$36 00
Montreal to Quebec, same rate.....	36 00
	<hr/>
	72 00
	<hr/>
	\$193 50

It should be stated that, from 10th to 19th November, the rates from Father Point or Bic to Quebec and return, are \$4.60 and \$4.15 per foot draft respectively. The pilotage of a vessel of 18 feet draft, towards the close of the season, would therefore be \$229.50

It appears from the foregoing pilotage statements, that the disadvantage to Montreal, is very much more one of *distance* than *expense*. The rates are all higher to other ports than to Montreal; and the totals for the summer season compare as follows:—

	Total mileage.	Pilotage charges.
To and from Boston.....	18	\$117 90
“ New York	42	172 80
“ Philadelphia	206	162 00
“ Baltimore.....	354	180 00
“ Montreal.....	622	193 50

1. It is suggested that when the system of telegraphic communication in the Gulf and River St. Lawrence is completed, pilotage arrangements may be very much simplified, and the services of Pilots be made more available than heretofore, and their numbers largely reduced. This may be effected by the establishing of a station or stations, with which the masters of in-coming vessels could communicate by use of the electro-signal service.

2. The Pilot-service ought to be an open one,—to which all competent men should be admitted, and each Pilot allowed to receive and hold all his own earnings.

3. No deep-sea pilotage charges should be exacted from any vessel, upward or downward, when in tow of a tug, the Master of which is a duly licensed Pilot of the first-class.

4. Rates of pilotage should be reduced, and all inefficient and incapable men removed from the Pilot rolls.

VI.—THE TOWAGE QUESTION.

6th. What remedy your Board would propose to lessen the cost of Towage of Sailing Vessels from Father Point to Quebec and from Quebec to Montreal.

Although rates of towage at other ocean ports are not asked for by the Minister of Public Works, it has been considered worth while, as far as practicable, to make a comparison on a basis similar to that on which the information about Pilotage has been given.

1.—PORT OF BOSTON.

The rate for towing a 600-ton vessel, drawing 18 feet water, from Boston Light to dock, and *vice versa*, are:—

Inward.....	\$35 00
Outward.....	35 00
	<hr/>
	\$70 00

If a vessel takes a tug outside of Boston Light, inwards,—or is towed outward beyond that Light,—the additional service is a matter of agreement between the vessel and the tug.

2.—PORT OF NEW YORK.

A 600-ton vessel may be towed at the following rates:—

Inward.....	\$35 00
Outward.....	35 00
	<hr/>
	\$70 00

Masters of vessels make bargains with tug-boats to tow in accordance with the necessities of the case. Sometimes, wind and tide favouring, the tug leaves the vessel at the Narrows, which is 6 miles from the Battery;—with wind and tide unfavourable, the tug will go from 15 to 20 miles.

"There are no legal rates established for towing, the charge depending on distance, state of weather, and size of vessel. In favourable weather, a vessel of 300 or 400 tons can be towed in for \$30; 600 tons, \$35; 1,000 tons, \$45, and if the vessel knows where she is to be docked, this is included. *If the vessel is, for any reason, obliged to use steam to come in, much higher rates are required.* Outward towage is governed by the same rules."

3.—PORT OF PHILADELPHIA.

The charges for towing a 600-ton vessel, drawing 18 feet water, from the Cape of the Delaware to the city, a distance of 103 miles, would be:—

Inward, 50c. per mile	\$51 50
Outward, 75c. per mile.....	77 25

\$128 75

Summer rates are by agreement. Inward-bound craft frequently sail up to Reedy Island, which is 46 miles from the city, and there take steam. It is not usual for outward vessels to tow below Reedy Island. In that case the towage would only cost \$57.56.

The tug-boats on the Delaware River are said to be the most powerful in the world, being each of about 2,500 horse power.

4.—PORT OF BALTIMORE.

Towage charges on a 600-ton vessel, 18 feet draft of water, from Cape Henry to Baltimore, 177 miles, would be:—

Inward	\$142 00
Outward.....	142 00

\$284 00

5.—PORT OF MONTREAL.

It would be misleading to quote rates of towage here, as in the foregoing examples; for the simple reason that though tow-boat officials sometimes refer to the "regular tariff," there is practically no recognized tariff of rates for tug-boat service in the Gulf and River St. Lawrence. There seems to have been one, however, bearing date 1874; because the Canada Shipping Company framed a list of charges for season 1880, for the services, when required, of their tug "Lake," the terms being mentioned as 50 per cent. less than those of 1874. According to that reduction a 600-ton vessel, drawing 18 feet water, would be charged 4c. per ton for first-class service, from Quebec to Montreal, or \$276 for the trip, (the downward rates by both tariffs being 25 per cent. less), while the charge under the *régime* of 1874 would presumably be \$552. But there was, in 1876, a towage tariff issued by "Opposition Tow-boats," according to which the rate for a vessel as above, was 9½c. per ton, or \$546 up from Quebec. The difference between the supposed-to-be regular tariff of 1874, and the one of 1876, was so small as to lead to the belief that the opposition was of a very nominal kind,—serving only to mislead unsuspecting ship-masters. The above-mentioned Company's rate from Father Point to Quebec is \$175, or \$306.25 both ways.

6.—HOW THE TOWAGE BUSINESS IS WORKED.

The towing-service in the River and Gulf of St. Lawrence has been characterized as inefficient,—it being alleged that there are steamers of one kind and another engaged in it, that were not originally intended for that sort of work, and which, as might be expected, are poorly adapted for it. The tariff rates charged, too, are exorbitantly high, the mode of exacting them is arbitrary and irregular, often oppressive—it seeming to be the settled belief of tow-boat organizations, that the commerce of Canada's Great Water-Highway *must* afford them revenue.*

* A well-informed person at Quebec, writes somewhat roughly, under date 20th September, as follows:—

"The Tariff made by the Beaver Line, is just one-half of that for 1876, but we don't even get that for four-fifths of the vessels. There have been seven vessels taken up this year, that have paid full tariff; but that was caused by the ignorance of the Masters, and the unblushing lying of Agents, which some of the Tug-owners keep for the purpose. Several of us have given orders not to take Montreal vessels at the low rates current,—but to give Quebec vessels a preference in all cases. The detention of Pilots up and down, expenses in current, and moorages in harbour, have rendered the business, at current rates, a losing one."

A number of detailed lists have been obtained of vessels,—showing tonnage, draft, rates of charge, &c., &c.,—towed for varying distances between Bic and Quebec up to Montreal, and return, in the seasons of navigation 1878, 1879 and 1880;—and they indicate how inconsistent and inequitable are the rates levied. It would unnecessarily swell this answer, to give the lists here referred to in full; but the following brief *résumé* of some of them may be sufficiently explicit.

Season of Navigation, 1878.—Out of one list of 24 vessels towed up to Montreal and back to Quebec, the sum exacted in four instances was \$550, the tonnages being respectively 803, 349, 690 and 349. Four vessels paid \$500 each, the respective tonnages being 744, 699, 739 and 388. Four vessels paid \$300 each, the respective tonnages being 633, 398, 490 and 288. A vessel of 633 tons paid \$285, and one of 414 tons paid \$212.

Season of Navigation, 1879.—Out of one list of 14 vessels, one of 510 tons paid \$811.45;—one of 813 tons paid \$500;—\$450 was paid for one of 729 tons;—\$440 for 330 tons;—\$425 for 628 tons, and \$195 for 521 tons.

Season of Navigation, 1880.—Out of 14 vessels, the amount exacted in two instances was \$500 each, the tonnages respectively being 871 and 872. The sum of \$450 was paid for 787 tons;—\$400 each for 729, 364 and 354;—\$350 for 769;—\$330 for 396;—\$250 for 237;—\$230 for 147;—and \$225 for 249 tons.

Further for 1880.—A barque of 1,000 tons paid \$600 for towage from below Quebec to Montreal and return; while a ship of 1,135 tons had to pay \$1,325. In the latter instance, the Master was on his first trip to the River St. Lawrence; and he imagined the matter was all right, when, without stating any sum, the official on the tug said he would be towed up for 20 per cent. less than the tariff rate! A barque of 770 tons was charged \$250; while another of 500 tons had to pay \$810 for like service. A brigantine of 508 tons recently paid \$260 from below Quebec to Montreal and return; the same Agents having, in 1874, a barque of 510 tons which had to pay more than three times that amount for similar service. A tug offered to take a vessel up to Montreal and back to Quebec for \$450,—to which the Captain assented, on condition that if his Agent at the latter port had made any arrangement, he should not be required to pay more than the Agent had bargained for. On arrival it was found that an agreement had been made for \$300.

The vessels which suffer most are those which come into the St. Lawrence trade for the first time; and their experience is often so hard and cheerless that they never return. The greatest perplexity and annoyance experienced by owners of tonnage in Europe are believed to arise mainly from the uncertainty of towage expenses; and here can hardly be a doubt that this keeps away many a ship from Montreal, giving colour to the exaggerated reports which have gained credence respecting exorbitant charges of every kind to which all vessels are subjected.

7.—SUGGESTIONS TOWARDS A REMEDY.

1. Rates of towage should be reduced to a minimum, and the Harbour Trust of Montreal might be empowered to provide towage facilities, at not more than cost of service.

2. Or, a Company with suitable vessels, might be subsidized for the purpose of securing strict adherence to rates under cost to vessels.

3. Or, it might be worth considering, whether the service should be left open to competition by all tow-boats that may be licensed as to their fitness, and to be governed by a uniform tariff of rates, which shall be maxima. Vessels towed could be left, during the busy season, in Hochelaga Bay, until there is berth-room,—and then brought up by the chain-tug, and docked by a harbour-tug, at fixed rates, which should be deducted from the tow-boats' accounts.

4. The Captain of all tug-boats should be licensed Pilots.

5. For the prevention of any possible over-charge, all rates of towage might be made payable at the office of the Harbour Trust.

ADDITIONAL INFORMATION.

RATES OF OCEAN FREIGHT.

There is a current theory that the larger the vessel the less the cost of transport. As regards the Upper Lake Trade, the President of the Buffalo Board of Trade has put the case thus:—

“At the same rates a vessel carrying 60,000 bushels of corn makes a profit of \$740 on the round trip from Chicago to Buffalo and return, where a vessel carrying 21,000 bushels, gains but \$83.30, the rates in this case being 2 cents per bushel for corn and \$1.00 per ton for coal (carried on the return trip), giving to each vessel the same proportionate return cargo. Calling the rate 4 cents per bushel for corn and \$1.00 per ton for coal, the smaller vessel would gain \$743.50 while the larger one would show \$2,540 on the profit side of the ledger.”

Writing to the Secretary, under date 2nd November, 1874, the late Hon. John Young, then Chairman of the Montreal Harbour Commission, said:—

“The effect on the cost of outward freight, by deepening of the channel to 21 feet, and employing the large ship, has been to reduce freight 33½ per cent., compared with the rates current previous to the improvement of the channel * * The Harbour Commissioners believe that the cost of freight will thus be diminished, and as a consequence, that the value of what is exported will be increased to the producer, and imports cheapened to the consumer.”

Only a day or two before Hon. Mr. Young's decease, he requested that a statement of ocean freight rates at Montreal should be prepared,—going as far back as the record of the Corn Exchange Association would admit of,—he being of opinion that the quotations would show a continuance of the reduction.

Since then a good deal of labour and care have been expended in arranging a table of average rates of ocean freight for heavy grain to Liverpool, by steamships and sailing vessels, for each month and for each year from 1861 to 1879 inclusive,—see next page.

AVERAGE RATES OF FREIGHT FOR HEAVY GRAIN PER 480 LBS. FROM MONTREAL TO LIVERPOOL.

Year.	May.		June.		July.		August.		September.		October.		November.		Average for Year.	
	Sail.	Steam.	Sail.	Steam.	Sail.	Steam.	Sail.	Steam.	Sail.	Steam.	Sail.	Steam.	Sail.	Steam.	Sail.	Steam.
1861.....	8 3		7 6		7 7½		6 1½				8 1½				7 10	
1862.....	6 10½	10 0	7 0½		7 11½	9 2	9 6	9 5	9 0½	10 5	11 1	11 1	9 6		8 7	10 4
1863.....	6 7½	7 11	6 3½	8 0	6 2½	7 10	6 1	6 7½	6 3	5 10½	3 10½	5 2	3 11½	12 5	5 7½	6 10
1864.....	5 3	6 3½	6 0	6 9½	5 1	5 5	5 3	5 7	5 6	5 11	4 7½	5 0		6 4	5 3½	5 10
1865.....	3 9	3 9	3 9	3 9	4 11½	4 11½		4 6	5 0	5 0	4 6	6 1	4 1½	6 0	4 0½	4 10
1866.....		7 0	5 2½	6 2		5 0	4 2	4 4½	4 2	4 10		5 10			4 8	5 10½
1867.....	5 1	6 6	4 7	6 6	4 8½	6 1½		4 4	4 9	6 3	7 10	6 7	8 9	7 11	6 2	7 5
1868.....	4 3	6 10½	4 6	5 7½	4 2½	4 2½		4 0	7 5		5 6	6 4	8 9	7 0	4 10	5 8½
1869.....	3 4½	4 6	4 9	5 3½	4 3	5 8½	6 1½	5 7½	4 10½	7 6½	7 0	8 2	7 0	8 5	6 2	6 5½
1870.....	5 5½	5 7½	4 9	6 0½	4 3	5 10½	6 0	6 1	4 10½	5 5	4 8	4 11	4 10½	6 5	5 0	5 6
1871.....	5 3	5 10½	6 1	6 10½	5 10½	5 10½	6 7½	6 8½	7 1	7 6½	4 8	8 6	7 1	8 6	5 5	7 1½
1872.....	4 4	4 10	5 2	5 2	6 1	6 1	6 0	6 0	6 11	6 11	7 0	9 0½	7 6	8 6	6 4	6 6½
1873.....	7 1½	7 1½	8 6	8 11½	7 6	8 9	7 7	8 4	9 10	10 8	8 5		12 6	13 6	8 10	9 7
1874.....	8 7	8 11	8 6	8 8½	4 4	6 1	3 9	4 9	4 0	4 1½		4 6½	4 1½	5 7½	5 3	5 10½
1875.....	4 7½	4 5½	5 1	5 4½	7 3	5 5	5 8½	5 8½	5 9	5 2½	3 6	4 2	4 1½	8 7½	5 11	6 0
1876.....		5 6		5 8½	3 7½	5 3	4 10½	4 9	5 2½	5 1½	7 2	6 1	5 5	5 5	5 5	5 5
1877.....	4 0½	4 0½	4 4	4 4	3 7½	3 7½	4 10	4 10	7 2	8 2½	8 2½	5 2½	7 10	7 10	5 8½	5 8½
1878.....	5 6	5 6	5 11½	5 11½	5 1	5 1	4 4½	4 4½	4 7	4 7	5 0½	5 2	5 11	5 11	5 2½	5 2½
1879.....	3 5	3 5	3 7	3 7	3 9	3 9	5 4	5 4	5 8½	5 8½	No quotations.	7 0	No quotations.	6 6	4 4	5 0½

The average annual rates for steam and sail are shown in the last column. Separating these yearly averages into two periods of nine years each,—the first one (1862 to 1870,) gives an average rate of 5s. 7d. stg. per 480 lbs. for sail-craft, and 6s. 6d. for steamships,—the averages for the second (1871 to 1879,) being respectively 5s. 11d. and 6s. 3d. These results show an increase of 4d. for sail-craft, during the last period, but a *decrease* of 3d. for steamships. It would appear, therefore, that, on the foregoing theory, all the advantages of larger vessels have not yet accrued to Montreal exporters. There can be no doubt, however, that the greater tonnage of the vessels employed in the regular grain-carrying trade of the River St. Lawrence (especially of steamships) in later years, has given facilities for vastly more rapid transportation of larger cargoes.

A remark made elsewhere, regarding freight-rates on inland waters, may be repeated here, viz., that while *averages* for periods of years are *convenient* criteria, they do not always afford sufficient data for conclusions. The tables on pp. 493 and 494 will enable the enquirer to ascertain the rates of ocean-freights on one day in each week during the seasons of summer navigation in 1878 and 1879, at Montreal, Boston, New York and Baltimore; while a table on page 495 affords data for comparing rates once a week at New York and Montreal, in the present year (1880).

COMPARATIVE RATES from Montreal and Boston to Liverpool for Two Years.

DATE.	1878.						1879.					
	Montreal to Liverpool. Per 480 lbs.				Boston to Liver- pool. p. 60 lbs.		Montreal to Liverpool. Per 480 lbs.				Boston to Liver- pool. p. 60 lbs.	
	Sail.		Steam.		Steam.		Sail.		Steam.		Steam.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 3.					9	0	to					
do 10.									8	0		
do 17.									9			
do 24.									9			
do 31.									10			
Feb. 7.									10			
do 14.									10			
do 21.									9			
do 28.									9			
Mar. 7.									8			
do 14.									7			
do 21.									7			
do 28.									6			
April 4.									7			
do 11.									6			
do 18.									6			
do 25.									6			
May 2.									6			
do 9.	5	0	to	5	6	5	0	to	6			
do 16.	5	3	"	5	9	5	3	"	5	9		
do 23.	5	3	"	5	9	5	3	"	5	9		
do 30.					5	6	"	6	0			
June 6.	5	9	"	6	0	5	9	"	6	0		
do 13.	5	9	"	6	0	5	9	"	6	0		
do 20.					6	0	"	6	3			
do 27.					5	9	"	6	3			
July 4.					5	6	"	6	0			
do 11.					4	6	"	5	9			
do 18.	4	6	"	5	0	4	6	"	5	0		
do 25.	4	6	"	5	0	4	6	"	5	0		
Aug. 1.	4	0	"	4	6	4	0	"	4	6		
do 8.	4	0	"	5	0	4	0	"	5	0		
do 15.	4	0	"	4	6	4	0	"	4	6		
do 22.	4	0	"	4	6	4	0	"	4	6		
do 29.	4	3	"	5	0	4	3	"	5	0		
Sept. 5.	4	6	"	5	0	4	6	"	5	0		
do 12.	4	6	"	5	0	4	6	"	5	0		
do 19.	4	0	"	5	0							
do 26.	4	3	"	4	6	4	3	"	4	6		
Oct. 3.	5	0	"	5	3	5	0	"	5	3		
do 10.					5	0	"	5	3			
do 17.					5	0	"	5	3			
do 24.	4	6	"	5	0	5	0	"	5	6		
do 31.	5	0	"	5	6	5	0	"	5	6		
Nov. 7.	5	6	"	6	0	5	6	"	6	0		
do 14.	6	6	"	7	0	6	6	"	7	0		
do 21.												
do 28.												
Dec. 5.												
do 12.												
do 19.												
do 26.												

COMPARATIVE RATES from New York and Baltimore to Liverpool for Two Years.

Date.	1878.				1879.			
	New York to Liverpool. Per 60 lbs.		Baltimore to Liverpool. Per 60 lbs.		New York to Liverpool. Per 60 lbs.		Baltimore to Liverpool. Per 60 lbs.	
	Steam.	Sail.	Steam.		Steam.	Sail.	Steam.	
	d.	d.	d.	d.	d.	d.	d.	d.
Jan. 3.....	9 $\frac{1}{2}$	8 $\frac{1}{2}$	11	to 11 $\frac{1}{2}$	5 $\frac{1}{2}$	.....	6	.....
do 10.....	10	8 $\frac{1}{2}$	10 $\frac{1}{2}$	" 11	6	.....	6 $\frac{1}{2}$	.....
do 17.....	9 $\frac{1}{2}$	8	11	" 11 $\frac{1}{2}$	5 $\frac{1}{2}$	.....	6 $\frac{1}{2}$	.....
do 24.....	9 $\frac{1}{2}$	7 $\frac{3}{4}$	11	" 11 $\frac{1}{2}$	6 $\frac{1}{2}$	6	7	.....
do 31.....	9 $\frac{1}{2}$	7 $\frac{1}{2}$	11	11	5 $\frac{1}{2}$	6	7 $\frac{1}{2}$	.....
Feb. 7.....	9 $\frac{1}{2}$	7 $\frac{1}{2}$	11	11	5 $\frac{1}{2}$	5 $\frac{1}{2}$	8	.....
do 14.....	10	7 $\frac{1}{2}$	11	11	6	5	6 $\frac{1}{2}$	.....
do 21.....	9	7 $\frac{1}{2}$	11	11	6	5 $\frac{1}{2}$	to	7
do 28.....	8	7 $\frac{1}{2}$	10 $\frac{1}{2}$	to 11	6	5 $\frac{1}{2}$	7 $\frac{1}{2}$	.....
Mar. 7.....	7 $\frac{1}{2}$	7	10	" 10 $\frac{1}{2}$	6 $\frac{1}{2}$	5 $\frac{1}{2}$	7 $\frac{1}{2}$	.....
do 14.....	6 $\frac{1}{2}$	6 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	6 $\frac{1}{2}$	5 $\frac{1}{2}$	7 $\frac{1}{2}$	.....
do 21.....	6 $\frac{1}{2}$	6 $\frac{1}{2}$	9	to 9 $\frac{1}{2}$	6	5 $\frac{1}{2}$	7 $\frac{1}{2}$	.....
do 28.....	7	6 $\frac{1}{2}$	9	" 9 $\frac{1}{2}$	5 $\frac{1}{2}$	5 $\frac{1}{2}$	to	7
April 4.....	8 $\frac{1}{2}$	7 $\frac{1}{2}$	9	9	5 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{2}$	.....
do 11.....	8	7	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6	5 $\frac{1}{2}$	to	7 $\frac{1}{2}$
do 18.....	7	6 $\frac{1}{2}$	8 $\frac{1}{2}$	to 8 $\frac{1}{2}$	6	5 $\frac{1}{2}$	7 $\frac{1}{2}$	.....
do 25.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{2}$	.....
May 2.....	8 $\frac{1}{2}$	8	9	9	5 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{2}$	.....
do 9.....	8	7	9 $\frac{1}{2}$	to 9 $\frac{1}{2}$	5 $\frac{1}{2}$	5 $\frac{1}{2}$	to	6 $\frac{1}{2}$
do 16.....	8	7	8 $\frac{1}{2}$	" 9	5 $\frac{1}{2}$	5	to	6 $\frac{1}{2}$
do 23.....	7 $\frac{1}{2}$	6 $\frac{1}{2}$	8	" 8 $\frac{1}{2}$	5 $\frac{1}{2}$	5	6	.....
do 30.....	8	7	8	8	5 $\frac{1}{2}$	5	5	.....
June 6.....	8 $\frac{1}{2}$	7	8 $\frac{1}{2}$	8 $\frac{1}{2}$	5 $\frac{1}{2}$	5	5	.....
do 13.....	8 $\frac{1}{2}$	7	8 $\frac{1}{2}$	to 9	5	4 $\frac{1}{2}$	4 $\frac{1}{2}$	to 5
do 20.....	8 $\frac{1}{2}$	7 $\frac{1}{2}$	9	9	4 $\frac{1}{2}$	4 $\frac{1}{2}$	6 asked.	.....
do 27.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	to 9	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4	to 4 $\frac{1}{2}$
July 4.....	7	.....	8 $\frac{1}{2}$	" 8 $\frac{1}{2}$	4	4 $\frac{1}{2}$	4	to 4 $\frac{1}{2}$
do 11.....	7	.....	8 $\frac{1}{2}$	" 8 $\frac{1}{2}$	5	4 $\frac{1}{2}$	5	.....
do 18.....	6 $\frac{1}{2}$	.....	7	7	6 $\frac{1}{2}$	.....	7	to 7 $\frac{1}{2}$
do 25.....	6	5	8	8	7 $\frac{1}{2}$	.....	7 $\frac{1}{2}$	to 8
Aug. 1.....	7 $\frac{3}{4}$	6	8	8	7 $\frac{3}{4}$	.....	8 $\frac{1}{2}$	" 8 $\frac{1}{2}$
do 8.....	8	6	8	8	8 $\frac{1}{2}$	.....	8 $\frac{1}{2}$	" 8 $\frac{1}{2}$
do 15.....	8	.....	7 $\frac{1}{2}$	to 8	7 $\frac{1}{2}$	7 $\frac{1}{2}$ to 8	8	" 8 $\frac{1}{2}$
do 22.....	7 $\frac{1}{2}$	7	7 $\frac{1}{2}$	to 8	7 $\frac{1}{2}$	7	8	.....
do 29.....	7	7	7 $\frac{1}{2}$	to 8	7 $\frac{1}{2}$	7	7 $\frac{3}{4}$	to 8
Sept. 5.....	6 $\frac{1}{2}$	.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	7	.....	7 $\frac{1}{2}$	to 8
do 12.....	5 $\frac{1}{2}$	.....	6 $\frac{1}{2}$	to 7	6 $\frac{1}{2}$	.....	6 $\frac{1}{2}$	to 6 $\frac{1}{2}$
do 19.....	5 $\frac{1}{2}$	.....	6 $\frac{1}{2}$	" 6 $\frac{1}{2}$	7 $\frac{1}{2}$	7	6 $\frac{1}{2}$	" 6 $\frac{1}{2}$
do 26.....	6 $\frac{1}{2}$	.....	6 $\frac{1}{2}$	6 $\frac{1}{2}$	7 $\frac{1}{2}$	.....	7	8
Oct. 3.....	6 $\frac{1}{2}$	6	6 $\frac{1}{2}$	6 $\frac{1}{2}$	9	9	9	.....
do 10.....	6 $\frac{1}{2}$	6 $\frac{1}{2}$	6	to 6 $\frac{1}{2}$	9	9	9	.....
do 17.....	7 $\frac{1}{2}$	.....	8	8	8 $\frac{1}{2}$	8	9 $\frac{1}{2}$	.....
do 24.....	7 $\frac{1}{2}$	.....	8	8	7 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	.....
do 31.....	8	7 $\frac{1}{2}$	8	8	6 $\frac{1}{2}$	6 $\frac{1}{2}$	9	.....
Nov. 7.....	7 $\frac{3}{4}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8	7	9	.....
do 14.....	7 $\frac{3}{4}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	to 8 $\frac{1}{2}$	6 $\frac{1}{2}$	7	9	.....
do 21.....	7 $\frac{3}{4}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	" 8 $\frac{1}{2}$	6 $\frac{1}{2}$	7	7 asked.	9 $\frac{1}{2}$
do 28.....	7 $\frac{3}{4}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	6	6	to 6 $\frac{1}{2}$
Dec. 5.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{3}{4}$	8	5 $\frac{1}{2}$	5	5	.....
do 12.....	6	.....	8 $\frac{1}{2}$	to 8 $\frac{1}{2}$	4	4 $\frac{1}{2}$	4	.....
do 19.....	5 $\frac{1}{2}$	.....	7 $\frac{1}{2}$	7 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	.....
do 26.....	5 $\frac{1}{2}$	.....	7	to 7 $\frac{1}{2}$	3	.....	5	.....

The following quotations for 1880, show rates in Montreal as compared with New York:—

Date.	Montreal.						New York.		
	Per quarter of 480 lbs.				Per bushel of 60 lbs.			Per bushel of 60 lbs.	
	Iron Clipper and Steam.						Steam.	Sail.	
1880.	s.	d.		s.	d.	d.	d.	d.	
May 7.....	4	0	@	4	6	6	@	4½	
do 14.....	3	9	"	4	3	5½	"	4½	
do 21.....	3	9	"	4	3	5½	"	4½	
do 28.....	3	6	"	4	0	5½	"	3½ @ 4	
June 4.....	3	6	"	4	0	5½	"	3	
do 11.....	3	9	"	4	3	5½	"	4	
do 18.....	4	0	"	4	3	6	"	5	
do 25.....	4	3	"	5	0	6½	"	5½ @ 4½	
July 2.....	4	9	"	5	3	7	"	6	
do 9.....	4	9	"	5	6	7½	"	.....
do 16.....	4	6	"	5	6	7½	"	6½	
do 23.....	5	0	"	5	6	7½	"	5	
do 30.....	5	3	"	6	0	7½	"	6½	
Aug. 6.....	5	6	"	6	0	8½	"	8	
do 13.....	5	0	"	5	9	7½	"	7½	
do 20.....	4	0	"	5	0	6	"	7½	
do 27.....	3	6	"	4	3	5½	"	6½	
Sept. 3.....	3	0	"	4	0	4½	"	6½	
do 10.....	2	9	"	3	6	4½	"	5½	
do 17.....	2	9	"	3	6	4½	"	5½	
do 24.....	2	9	"	3	9	4½	"	5½	
Oct. 1.....	3	3	"	4	0	4½	"	5½ @ 5½	
do 8.....	4	0	"	5	0	6	"	6½	
do 15.....	4	0	"	5	0	6	"	6	

There is a consideration that must not be overlooked, viz., that, other things being equal, the prevalence of high rates of ocean freight might be expected to induce vessels to seek the port where these can be obtained. A fair axiom would be: High rates of freight, *cet. par.*, should bring tonnage to the St. Lawrence,—more vessels would, by competition, tend to lower rates,—and this cheapening of transportation would naturally bring more freight to Montreal. The question is, therefore, a pertinent one:—What has prevented more vessels from seeking the port where they could seemingly earn most money?—and the reply is,—nothing but the more than countervailing charges that would be incurred. The hoped-for advantages of lower rates of freight, will be the result of lower port dues, less exorbitant towage charges, cheaper pilotage, and such improvements for navigating the River and Gulf as will lead to lower rates of insurance.

But, notwithstanding all the drawbacks and disadvantages, there are, this year, two features in the trade of the River St. Lawrence, deserving of notice. (1.) There has been a steady flow of grain from the West for shipment across the Atlantic on other than Montreal account; and (2.) steam tonnage seeking charter, appears to be beginning to prefer Montreal over other Atlantic ports when offering rates are the same. As before suggested, this is, no doubt, to be attributed to the increased depth of water in the ship-channel, as well as to the agitation about reduction of dues and other charges.

CRAFT FOR PORTS OF CALL.

It is worthy of note that, while the charges incident to the deepening of the ship-channel bear heavily upon tonnage and merchandise, this is measurably com-

pensated for by the much larger class of steam and sail vessels now engaged in the regular trade between Montreal and Great Britain; for it seems that increased carrying capacity has not, within the past fifteen or twenty years, further resulted in materially lessening freight rates. But there is another class of serviceable vessels of much smaller tonnage (say 400 to 700 tons), and that, with a full cargo, draw from 15 to 18 or 19 feet of water, which it is considered desirable to keep in the St. Lawrence trade. It is alleged on behalf of such craft, hailing from Norway, Sweden, Germany, Austria, Italy, Spain, &c., that the improvement of the ship-channel to an depth beyond 20 feet, involves an unequitable percentage of assessment on them. The pilotage and harbour charges, and especially the uncertain and arbitrary rate often levied for towage, have tended to drive them away. The table on this page shows the number and tonnages of vessels (steam and sail) which came to the port of Montreal during the past decade, and cleared with grain to ports of call "for orders."

The decrease of vessels and cargoes in 1879 is remarkable, and unless the shipments formerly "for orders" are now being made direct to Continental ports, it may be fairly inferred that shippers of grain have so far lost some advantage which they formerly had when they used the class of vessels here referred to. The enlarged capacity of steam and sail vessels in the regular trade, and the constantly increasing percentage of steam tonnage, do not entirely compensate for their absence. From the statements on pp. 487 to 489, about towage, it will be seen how heavily and arbitrarily the charges for that service bear upon the class of vessels which have heretofore been in favour for ports of call.

There is another view of this part of the subject, as regards the trade of Montreal which is very seldom taken into account, viz., the loss that would be sustained by tradesmen and dealers, if the vessels here referred to are compelled to forsake the St. Lawrence. It may be stated, on the authority of firms doing business in this city, that, exclusively of pilotage, towage, harbour dues, &c., the average disbursements of vessels of 600 to 1,000 tons register, is about \$800 each. If this be so, then the absence of thirty-five port-of-call vessels in 1879, (that being the difference as compared with 1878), involved a loss to the local trade of \$28,000.

Year.	No. of Vessels.			TONNAGE.			CARGOES.							
	Steam.	Sail.	Total.	Steam.	Sail.	Total.	Wheat.	Corn.	Peas.	Oats.	Barley & Rye.	Flour.	Total.	
							Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
1870	...	...	26	.....	.....	9,835	306,395	.....	16,000	.....	.....	1,600	330,395
1871	...	...	74	.....	.....	27,203	408,463	22,376	.....	.....	.....	.....	430,839
1872	14	66	80	11,653	25,136	36,789	363,810	1,791,126	15,000	.....	.....	.....	2,169,936
1873	18	56	74	14,305	20,413	34,718	1,561,133	556,734	29,338	.....	.....	3,519	2,164,804
1874	21	75	96	17,018	31,301	48,319	1,727,864	716,778	180,169	35,207	.....	1,000	2,665,011
1875	1	93	94	955	37,474	38,429	1,659,233	241,699	261,063	.....	.....	.....	2,161,995
1876	2	90	92	2,117	35,491	37,608	738,084	1,122,793	156,837	102,437	.....	1,284	2,126,571
1877	26	60	86	21,474	27,862	49,336	1,243,155	971,724	208,211	24,360	445,317	.....	2,892,767
1878	12	77	89	11,502	34,803	46,305	1,210,890	958,698	383,088	17,747	47,380	.....	2,617,795
1879	...	54	54	.....	24,132	24,132	725,161	319,500	291,900	.....	17,901	.....	1,354,462

RATES OF MARINE INSURANCE.

The question of Marine Insurance is one of considerable importance in relation to the trade of the River and Gulf of St. Lawrence—rates heretofore having often constituted a considerable charge both upon imports and exports, and sometimes without equitable discrimination as to risk. The following are comparative (*nominal*) rates at the ports of New York and Montreal:—

	NEW YORK.		MONTREAL.	
	Sail.	Steam.	Sail.	Steam.
	per cent.	per cent.	per cent.	per cent.
to London.....	$\frac{3}{4}$ @ $2\frac{1}{2}$	$\frac{1}{2}$ @ 1	$\frac{3}{4}$ @ 3	$\frac{1}{2}$ @ $1\frac{1}{2}$
Liverpool.....	$\frac{3}{4}$ " 2	$\frac{1}{2}$ " 1	$\frac{3}{4}$ " 3	$\frac{1}{2}$ " $1\frac{1}{2}$
Glasgow.....	$\frac{3}{4}$ " 2	$\frac{1}{2}$ " 1	$\frac{3}{4}$ " 3	$\frac{1}{2}$ " $1\frac{1}{2}$
Cork.....	$\frac{3}{4}$ " 2	$\frac{1}{2}$ " 1	$\frac{3}{4}$ " 3	$\frac{1}{2}$ " $1\frac{1}{2}$
Havre.....	$\frac{3}{4}$ " 2	$\frac{1}{2}$ " 1	$\frac{3}{4}$ " 3	$\frac{1}{2}$ " $1\frac{1}{2}$
Hamburg }	$\frac{3}{4}$ " $2\frac{1}{2}$	$\frac{3}{4}$ " $1\frac{1}{2}$	$\frac{3}{4}$ " 3	$\frac{3}{4}$ " $1\frac{1}{2}$
Bremen }				
Bordeaux.....	1 " 2	$\frac{1}{2}$ " 1	1 " $3\frac{1}{2}$	1 " 2
Smyrna }	$1\frac{1}{2}$ " 2	$\frac{3}{4}$ " $1\frac{1}{2}$		
Trieste }				

The rates thus formulated would be apt to mislead, without a word or two of explanation; for, even if the quotations were uniformly obtained, there is a deduction of 20 per cent. made at both ports by American Companies, and 10 per cent. by European ones, the rates of the latter being said to be lower. Both of the statements give a wide range for the season. At Montreal, before the first of September, risks have been taken this year on grain in A 1 steam tonnage at three-eighths per cent., and at one-half to three-fourths per cent. by iron clippers and steamers in the regular trade. There is a rule—not exactly an iron-clad one—by which there is a rise in rates of one-eighth per cent. on and after 1st September, and further similar advances on 15th September, 1st October and 15th October respectively. Each addition of one-eighth per cent. is equal to \$1 on every 1,000 bushels of wheat so insured; the increase of one-half per cent. within the six weeks would, therefore, be equal to \$4 on every 1,000 bushels of wheat, and would add more than \$7,000 to the cost of the quantity (about 1,785,000 bushels) shipped from Montreal from 1st September to 15th October, in the present year. It is said that the ratio of advance on and after 15th October depends upon the weather; this, therefore, involves a special arrangement.

The rates tabulated above are somewhat higher for Montreal risks, than for those of New York. It has been remarked, however, that insurances have been effected on some occasions lately in which the difference favoured shippers here; and Insurance Companies appear now to be tacitly acknowledging the lessened risk by the competition which exists at variable rates, and below what may be called tariff charges. To say the least of it, there seems to be no good reason now for the same Companies exacting higher premiums on grain cargoes, for instance, shipped from Montreal, than are accepted by them from New York; for, during a period of seven years, (1873 to 1879 inclusive), of all the shipments from Montreal under the Port Warden's regulations—not a single accident or loss occurred all that time, in consequence of a vessel being grain-laden. On the other hand, during a period of about nine months (1st September, 1878, to 11th June, 1879), of the vessels which loaded grain at New York, seven were abandoned, and thirteen (13) reported missing.

The arrangements which have been in progress during the past three years, at the instance of the Dominion Government, for extending the telegraphic system to

the principal islands of the Gulf—notably, Anticosti, the Magdalen and St. Paul Islands, Bird Rocks, etc., are now on the eve of completion. The lighthouses in the River and Gulf of St. Lawrence will be placed in telegraphic connection with the shore-lines and signal stations, to work in accord with the International Code, which is capable of indicating 78,642 distinct signals. The project includes the establishment of a daily *Telegraphic Bulletin*, for transmitting frequent reports about the weather, vessels passing inward or outward, casualties, and communicating with pilot stations, tug companies, etc. When the work is completed—as it will probably be about the opening of navigation in 1881—it will be easy and safe for ships to navigate the great Canadian Water Highway. This surely warrants a considerable reduction in rates of marine insurance, and a large increase in the steam and sail fleet in the trade of the St. Lawrence.

SUMMARY OF CONCLUSIONS.

1. The carrying trade of Canada, *via* the River St. Lawrence, is embarrassed by a multitude of charges and rates of one kind and another; some are large, while many, singly and apart from the others, erroneously appear to persons unacquainted with details, to be of very little consequence. Water-borne merchandise from and to the West by the St. Lawrence route should be relieved from every extraneous burden—otherwise, our fair share of West-bound traffic and the proportionate volume of the eastward traffic will continue to decrease. Such an untoward result would make it appear that the many millions of dollars invested in the canal and shipping channel has been expended in vain. It seems, therefore, to be the dictate of wisdom that the water-highways of the Dominion, should, in the meantime, be made available for enlarging and extending Canadian commerce, whether they yield any present direct revenue to the Government or not.

2. Montreal can be made the cheapest and best port in the world for sea-going steam and sail tonnage. Such a consummation would be of incalculable benefit to the trade and commerce of the whole country; and the hearty co-operation of the shipping interest and the commercial organizations, with the Harbour Trust, the civil authorities and the Dominion Government, is invoked for its accomplishment.

3. The Dominion Government should immediately relieve the Harbour Trust from the expense attending the deepening of Lake St. Peter, and improving the shipping channel between Montreal and Quebec.

4. Wharfage on all ocean cargoes, inward and outward, should be reduced to the lowest possible rates, or if practicable abolished. Wharfage on ocean tonnage should be reduced to the level of Baltimore and Philadelphia, and abolished on grain, carrying inland craft.

5. Canal tolls on breadstuffs and provisions should be abolished, and inland traffic should be exempted from all obstructive charges. The use of the electric light in the harbour of Montreal, now admits of loading and unloading at night—to prevent detentions, therefore, between Kingston and Montreal, it will be essential to have Lakes St. Louis and St. Francis lighted, so as to be navigable by night for towage of barges.

6. The Harbour Trust of Montreal ought to be authorized to provide for an efficient towage service, at lowest possible rates.

7. With a view to greater efficiency, and to provide for the anticipated increase of vessels coming into the St. Lawrence trade, the pilotage service should be reformed, and pilotage charges reduced.

8. Rates and charges incident to the transfer, storage and loading of grain cargoes should be reduced to a minimum.

9. An effort should be made to reduce rates of premium of ocean marine insurance in accordance with lessened risks secured by the Port Warden's service, and the electro-signal and telegraphic system in the Gulf and River St. Lawrence.

APPENDIX No. 13.

REPORT AND ESTIMATES

ON THE

COST OF IMPROVING THE NAVIGATION

OF THE

RIVER ST. LAWRENCE

BELOW LAKE ST. FRANCIS,

BY

G. F. BAILLAIRGÉ,

Deputy Minister of Public Works,

AND

S. KEEFER, C.E.

APPENDIX No. 13

ESTIMATED COST OF IMPROVING CHANNEL OF ST. LAWRENCE BELOW
LAKE ST. FRANCIS.

MEMORANDUM FOR HON. H. L. LANGEVIN, K.C.M.G., C.B., MINISTER OF PUBLIC WORKS

In answer to the memorandum submitted by the Hon. Thomas Ryan, Senator respecting the deepening of some of the rapids between Lakes St. Francis and St. Louis, and certain improvements in the Lachine Rapids, I have the honor to transmit you herewith, as requested :

1. A copy of a Report and Estimate made by Mr. S. Keefer, 25th May, 1852 No. 19814. Mr. Keefer's estimate is for a channel of 11 feet in depth in smooth water, and of 12 to 13 feet in depth in rough or broken water, for the passage of vessels drawing 10 feet during ordinary summer water. Width not stated.

2. Four estimates, based partly on the soundings taken by Mr. Stewart for Mr. Keefer in 1852, and partly on soundings taken under my directions in connection with the Cedars Canal survey, viz. :—

No. 1.	For a channel 200	feet wide by 9	feet deep.....	\$110,000
No. 2.	do	200	do 10½ do	540,000
No. 3.	do	300	do 9 do	534,000
No. 4.	do	300	do 10½ do	986,000

No provision has been made in these estimates for the Lachine Rapids, Mr. Keefer's estimates being considered sufficient for the purpose, except as regards the three buoys recommended by Hon. Mr. Ryan, the cost of which will be very small. Mr. Keefer based his estimates on the supposition that the water is to be chiefly raised by means of piers and wing dams projecting from the shore or otherwise. His prices for crib work range from \$1.20 to \$1.40 per cubic yard. The prices at which such works are now estimated vary from \$2 to \$2.50 per cubic yard or more.

No provision is made in the present estimates for raising the water by means of wing dams. It is probable, however, that a considerable saving in the quantity of rock excavation may be effected by such works, but before this can be relied on or recommended, the various portions of the channel to be improved should be thoroughly examined in order to ascertain by means of soundings and levels the probable extent and cost of such structures, and their probable effect as regards raising the water and causing damage to the adjacent properties.

Having assisted Mr. James Stewart in the survey made for Mr. S. Keefer, and having afterwards surveyed portions of the river between Côteau Landing and the Cascades in connection with the proposed Cedars Canal, I beg to state that, although the soundings on which the preceding estimates are based, in each case, are as accurate and as numerous as could be taken with the means then placed at our disposal, viz. an ordinary boat with a tow line and anchors, and a sounding rod where practicable the surveys would have been much more satisfactory and complete if a tug steamer and scows, provided with the requisite equipment for anchoring in the rougher portions of the stream, had been used. These vessels, together with sounding apparatus were applied for at various times during the recent survey under my direction, along the north shore of the St. Lawrence, but the Department of Public Works did not consider it advisable to incur the necessary expenditure for completing the sounding of the rapids, although no complete chart of the river has been made as yet between Lakes St. Francis and St. Louis.

No use has been made of the soundings taken in 1854 by Messrs. Maillefert and Raasloff, as they are not considered sufficiently reliable for the present purpose.

When the work is decided on, the first portion of it to be proceeded with, in order to give an immediate benefit to navigation, is the removal of the boulders at various points noted in the estimates.

If the removal of the boulders and the rock excavation are not to be proceeded with simultaneously, a portion only of the plant will be required, such as stone lifters, scows and tugs, and it would probably be cheaper to hire a tug than to purchase one. In such cases the removal of the boulders alone will cost probably 50 per cent. more than the sums indicated in the estimates.

The cost of removing the boulders only, may be estimated as follows:—

Localities.	Dimension of Channel, in Feet.			
	Wide. Deep.	Wide. Deep.	Wide. Deep.	Wide. Deep.
	200 × 9	200 × 10½	300 × 9	300 × 10½
	\$	\$	\$	\$
Above Côteau or Prisoner's Island.....	5,205	23,408	15,435	53,843
Bacôt Hayes Shoal.....	5,340	8,517	8,016	12,777
Mary's Reef, Pointe à Coulogne.....	750	9,999	750	14,999
Total, inclusive of plant.....	11,295	41,924	24,201	81,619
Add Engineering, Super. and Contingen- cies	3,705	6,076	4,799	9,381
Total cost.....	15,000	48,000	29,000	91,000

Navigation down the rapids must cease during the progress of the works, or the plant used in their execution would have to be shifted every time a boat descended, the channels to be improved being too narrow. If descending vessels were allowed to pass, it would cause a great loss of time, and would be attended with great risk of accident and damage both to life and property, the current being very swift. Apart from this, casualties may occur when rafts are descending. Great care will, therefore, have to be taken, and the proper means provided for protecting the hands employed and the working plant, against rafts, it being difficult to direct these, especially when the wind is high and the current strong.

G. F. BAILLAIRGÉ,

Deputy Minister of Public Works.

OTTAWA, 13th April, 1880.

MEMORANDUM :—

SUBMITTED BY SENATOR RYAN, MAKING SUGGESTIONS FOR DEEPENING SOME OF THE RAPIDS TO ABOUT ONE FOOT THREE INCHES TO ONE FOOT SIX INCHES MORE THAN PRESENT DEPTH OF WATER.

First. Commencing at Côteau Rapids, at the head of the Côteau Island; obstruction, consisting of loose boulders, easily removed at moderate expense; distance not great; say 500 feet in length.

Second. Obstruction at the foot of the Côteau Island, consisting of flat rocks, more expensive than the preceding, requiring blasting; short distance.

Third. At Bacôt Hayes there is shallow water and an obstruction consisting of boulders easily removed; short distance.

Fourth. At Split Rock; flat rock; blasting required at entrance; distance short.
 Fifth. Leaving Split Rock; obstruction consisting of boulders, easily removed distance short. Best season to perform the work, is the fall of the year. Additional depth required, about 1 foot 3 inches to 1 foot 6 inches, all through the above place.
 Edward Ouellette, Pilot, Lachine, can designate and point out the spots.

Sixth. There being shallow water in midsummer from the foot of Lachine Rapids to about the middle of Nun's Island, and the channel being difficult of finding out in fogs, or late in the day when darkness commences to set in, it would be well to have three buoys, made of ordinary cedar posts, anchored by a chain so as to keep the head up, painted black, with a small part of the head white: the first to be placed at the foot of the Rapids, a short distance down, to indicate the channel; the next one a little south of the head of Nun's Island, and the third at about the middle of the Island, all in the channel.

S. KEEFER'S ESTIMATE.

Based on the Surveys, &c., of James Stewart, C.E., and T. C. Keefer, C.E., in 1851-1853.

IMPROVEMENT of the St. Lawrence navigation, from Prescott to Montreal, for descending vessels drawing 10 feet of water, as per Report of S. Keefer, Esq. C.E., No. 19,814, dated Montreal, 25th May, 1853.

Estimated cost of improving the steamboat channel	
through the Côteau, Cedars and Cascades Rapids....	\$108,280
Improvements at Lachine Rapids.....	4,000
Buoys between Prescott and Montreal.....	1,200
Superintendence and contingencies.....	6,520
	<hr/>
	\$120,000

N.B.—The above estimate is for deepening to 11 feet, or for a draught of 10 feet during ordinary summer water, which represents a depth of about 11' 4" on the upper sill of the guard lock at head of Beauharnois Canal.

See my memorandum 13th April, 1880.—G. F. B.

DETAILED ESTIMATE for improving the navigation of the Rapids of the River St. Lawrence for descending vessels drawing 10 feet of water.

Extract from Report No. 19,814, signed by Samuel Keefer, Esq., C.E., and dated Montreal, 25th May, 1853.

	Details.	Amount.
<i>At the Côteau Rapids.</i>		£ s. d.
Average.		
Pier No. 1....	250 feet long × 15 feet wide × 16 feet high = 2,222 cubic yards, at 6s....	666 12 0
	600 do × 15 do × 15 do = 1,667 do 6s....	500 2 0
Pier No. 2....	490 do × 15 do × 15 do = 4,089 do 6s....	1,226 14 0
	Blasting and removing rock and boulders to afford a depth of 11 feet at ordinary summer water, 2,000 cubic yards, at 25s.....	2,500 0 0
Pier No. 3....	2,200 feet long, averaging 15 feet in height and to be 18 feet uniform width = 22,000 cubic yards, at 7s. 6d.....	8,250 0 0
Total at Côteau Rapids.....		13,143 8 0
<i>At the Cascades Rapids.</i>		
Average.		
Pier No. 1....	900 feet long × 15 feet wide × 10 feet high = 5,000 cubic yards.....	
	200 do × 15 do × 17 do = 1,890 do	
	600 do × 15 do × 13 do = 4,333 do	
	11,223 do at 7s....	3,928 1 0
Pier No. 2....	800 do × 12 do × 9 do = 3,200 do at 6s. 6d	1,040 0 0
do 3....	700 do × 21 do × 18 do = 9,800 do at 7s. 6d	3,675 0 0
do 4....	630 do × 15 do × 12 do = 4,000 do at 7s....	1,400 0 0
do 5....	700 do × 15 do × 12 do = 4,667 do at 7s....	1,633 9 0
do 6....	900 do × 15 do × 10 do = 5,000 do at 7s....	1,750 0 0
Total for pier work.....		13,426 10 0
Blasting and removing rocks at the Balise and Haystacks.....		500 0 0
Total at Cascades Rapids		13,926 10 0
<i>At the Lachine Rapids.</i>		
Placing four beacon or guide cribs on the east side of the channel, at the head of Nun's Island, according to the chart, 40 feet long, 18 feet wide, and averaging 15 feet in height each, and in all containing 1,600 cubic yards, at 6s. 3d.		500 0 0
Allow for the operation of the lifting scows engaged in removing boulders from the channel		500 0 0
Total.....		1,000 0 0

ABSTRACT ESTIMATE.

	£ s. d.	\$ cts.
Côteau Rapids.....	13,143 8 0	52,573 60
Cascades Rapids.....	13,926 10 0	55,706 00
Lachine Rapids	1,000 0 0	4,000 00
Buoys between Prescott and Montreal.....	300 0 0	1,200 00
Superintendence and contingencies.....	1,630 2 0	6,520 40
	30,000 0 0	120,000 00

IMPROVEMENT of the St. Lawrence navigation between Lakes St. Francis and St. Louis.

G. F. BAILLARGE'S ESTIMATES.

Estimated cost of deepening the steamboat channel through the Côteau, Cedars and Cascades Rapids :—

1. For 9 feet at low water, and 200 feet wide.....	\$110,000
2. do 10½ do 200 do	540,000
3. do 9 do 300 do	534,000
4. do 10½ do 300 do	986,000

N.B.—These estimates are based on the lowest summer water, when there is a depth of 10 feet, 6 inches on the upper sill of the guard lock, at the head of the Beauharnois Canal. See my memorandum, 13th April, 1880.—G. F. B.

Quantities based on soundings taken in September, 1852, by Jas. Stewart, Esq., C.E., as shown on plan on record in Department of Public Works, and on those taken from 1876 to 1879, in connection with the Cedars Canal survey, along the north shore of the River St. Lawrence.

N.B.—16 inches were subtracted from all of Mr. Stewart's figures, in order to reduce the whole of the soundings in the channel to one and the same water level, viz., that corresponding to 10½ feet water on sill, guard lock, at head of Beauharnois Canal

The greatest draught of vessels hitherto descending the rapids is about 8 feet.

DETAILED ESTIMATES.

1. For a channel 200 feet wide by 9 feet deep :—

Nature of Obstructions and where Situated.	Quantities, Cubic Yards.	Price per Yard.	Amount.	Remarks.
		£ s cts.	\$ cts.	
Above Côteau or Prisoner's Island, boulders	694	5 00	3,470 00	Water smooth, current say 9 miles per hour.
Below do do rock.....	586	20 00	11,720 00	Water very rough and swift.
Between Ile aux Vaches and Ile au Raisin, La Barrière, opposite Cedars, rock....	333	15 00	4,995 00	Water smooth, current very swift, say 10 miles per hour.
Bacôt Hayes' Shoal, boulders	1,780	2 00	3,560 00	Smooth water, current about 4 miles per hour.
Mary's Reef, at Pointe à Coulonge, boulders	864	20 00	500 00	Comparatively smooth water.
Dog Reef, above Split Rock, rock.....	355	20 00	17,280 00	Rough and dangerous.
Haystacks, below Split Rock, rock			7,100 00	Very rough and swift water.
Total cost of rock excavation and removal of boulders			48,625 00	
ADD—For tug steamers, scows, anchors, chains, tools and other plant required....			55,000 00	
Superintendence and contingencies.....			6,375 00	
			110,000 00	

2. For a channel 200 feet wide by 10½ feet deep:—

Nature of Obstructions and where Situated.	Quantities, Cubic Yards.	Price per Yard.	Amount.	Remarks.
		¢/ cts.	\$ cts.	
Above Côteau or Prisoner's Island, boulders	3,121	5 00	15,605 00	Water smooth, current say 9 miles per hour.
do do do rock.....	602	15 00	9,030 00	do do
Below do do do	8,333	20 00	166,660 00	Water very rough, and rapid descent.
Between Ile aux Vaches and Ile au Raisin La Barrière, opposite Cedars, rock.....	963	15 00	14,445 00	Water smooth, current say 10 miles per hour.
Bacôt Hayes' Shoal, boulders.....	2,839	2 00	5,678 00	Smooth water, current about 4 miles per hour.
Mary's Reef, boulders.....	2,222	3 00	6,666 00	Comparatively smooth water.
Dog Reef, above Split Rock, rock.....	9,236	20 00	184,720 00	Rough and dangerous.
Hay Stacks, below Split Rock, rock.....	1,933	20 00	38,660 00	Very rough and swift water.
Total cost of rock excavation and removal of boulders.....			441,464 00	
ADD—For tug steamers, scows, anchors, chains, tools and other plant and accessories required			55,000 00	
Superintendence and contingencies.....			43,536 00	
			540,000 00	

3. For a channel 300 feet wide by 9 feet deep:—

Nature of Obstructions and where Situated.	Quantities, Cubic Yards.	Price per Yard.	Amount.	Remarks.
		¢/ cts.	\$ cts.	
Above Côteau or Prisoners' Island, boulders	2,058	5 00	10,290 00	Water smooth, current say 9 miles per hour.
do do do rock.....	976	15 00	14,640 00	do do
Below do do do	13,542	20 00	270,840 00	Water rough, steep descent.
Between Ile aux Vaches and Ile au Raisin La Barrière, opposite Cedars Village, rock.....	500	15 00	7,500 00	Water smooth, current say 10 miles per hour.
Bacôt Hayes' Shoal, boulders.....	2,672	2 00	5,344 00	Water smooth, current about 4 miles per hour.
Mary's Reef, Pointe à Coulonge, boulders.....			500 00	Comparatively smooth water, rapid.
Dog Reef, above Split Rock, rock	4,167	20 00	83,340 00	Rough and dangerous.
Haystacks, below do do	2,129	20 00	42,580 00	Very rough and swift water.
ADD—For tug, steamer, scows, chains, tools, and other plant accessories			435,034 00	
Superintendence and contingencies.....			55,000 00	
			43,966 00	
Total cost of rock excavation and removal of boulders.....			534,000 00	

4. For a channel 300 feet wide by 10½ feet deep :—

Nature of Obstructions and where Situated.	Quantities, Cu-bic Yards.	Price per Yard.	Amount.	Remarks.
			\$ cts.	
Above Côteau or Prisoners' Island, boulders	7,179	5 00	35,895 00	Water smooth, current say 9 mile per hour.
do do rock	2,650	15 00	39,750 00	do do
Below do do do	21,667	20 00	433,340 00	Water rough, steep descent.
Between Ile aux Vaches and Ile au Raisin La Barrière, opposite Cedars Village, rock	1,444	15 00	21,660 00	Water smooth, current say 10 mile per hour.
Bacôt Hayes' Shoal, boulders.	4,259	2 00	8,518 00	Water smooth, current say 4 mile per hour.
Mary's Reef, Pointe à Coulonge, boulders.	3,333	3 00	9,999 00	Comparatively smooth water.
Dog Reef, above Split Rock, rock.....	12,314	20 00	246,280 00	Rough and dangerous.
Haystacks, below do do	2,577	20 00	51,540 00	Very rough and swift water.
ADD—For tug, steamer, scows, chains, tools, and other plant and accessories required			846,982 00	
Superintendence and contingencies.			55,000 00	
			84,018 00	
Total cost of rock excavation and removal of boulders			986,000 00	

OTTAWA, 13th April, 1880.

G. F. BAILLAIRGÉ,
Deputy Minister of Public Works.

(No. 19,814).

MONTREAL, 25th May, 1853.

SIR,—Mr. James Stewart having furnished me with his chart and soundings of the Côteau and Cascades Rapids, prepared during the last summer, in accordance with instructions which he had received from me, I have thus been enabled to arrange a plan for their improvement, and have now the honour to submit the same with my final Report thereon for the information of the Commissioners.

The situation and extent of the works proposed for that object are marked upon the accompanying chart, in red, and will be referred to more particularly in the following part of this Report.

It is important to observe, in reference to the proposed plans for the improvement of the rapids, that the draught of water is not necessarily limited to that of the St. Lawrence Canals, which is nine feet, nor to that of the Welland Canal, which is nine and a half feet, but may be increased to such extent, as for the creation of further commercial facilities, may be considered expedient.

In every case, therefore, where any improvement is proposed, it will be with a view of affording a clear draught of ten feet at ordinary summer water.

To secure this draught the channel should not be less than eleven feet deep in smooth water, and in places where it becomes rough and broken by the descent, it should be as much as twelve or thirteen feet in depth, according to situation, and to the extent of the undulations created by the current, in order to afford room for the "send" settling down of the vessel in passing through them.

For vessels descending all the rapids between Prescott and Montreal, the draught is at present limited to seven feet or thereabouts, by the shallows of the Cascade Rapids; but according to the soundings taken on previous occasions in the different rapids above Lake St. Francis, it does not appear that any works are required west

ward of that lake to obtain the desired draught of ten feet; and nothing further is proposed than the placing of a few buoys to mark out the channel.

Considering it, therefore, unnecessary, for the present, at least, to incur any expense at the Galops, Rapide-Plat or Long-Sault Rapids, the first improvement called for below Prescott is at the

CÔTEAU RAPIDS.

These rapids are approached from Lake St. Francis by four different channels.

1. The North Channel, used only by rafts.
2. The Old Channel, between Pig and Prisoners' Island, now no longer navigated.
3. The new channel between Pig and Thorn Islands, which is the one now exclusively used by steamboats, and
4. The new south channel explored by Mr. T. C. Keefer in 1850, between Thorn and Juniper Islands, and approachable from the south side of the lake by the head of Clarke's Island.

The first of these channels is quite too shallow to admit of improvement. In the second which is the most direct, a ridge of boulders resting upon a flat rock, stretches across the channel and limits the draught to 7 feet. The third is the deepest of all, ranging from 9 to 12 feet, but it is too crooked to admit of being navigated except by steam power.

The fourth is as yet untried. It is represented as varying in depth from 15 to 20 feet until it reaches the swift current between Thorn and Juniper Islands, where the depth is marked 10 feet.

If the new south channel were once buoyed out, and about one foot in depth of the rock at Juniper Island blasted out of it, it would appear that a good navigable channel thus far could be obtained at the least expense, but it would not be advisable to do any blasting until the practicability of this channel had first been tested after being buoyed out, because from the manner in which the shoals putting out from the several islands bordering the channel, appear to lie in relation to it and the current, a doubt has been raised as to whether it can really be navigated to any better advantage than the new channel now in use. If this should prove to be the case after trial and I must say, I am apprehensive it will—I would then recommend making choice of the old channel for improvement, because it is the most direct and convenient of all.

In making my estimate I have therefore provided for the construction of two guide piers, also the excavation of a channel through the narrowest part of the ridge, of 200 feet in width, and situated near the head of Prisoner's Island, and where the water is deep above and below the ridge. From the accurate soundings taken at this place by Mr. Stewart, it appears that it will require the removal of 1,700 cubic yards of rock and boulders between the proposed piers to give a depth of 11 feet at ordinary summer water, but in my estimate I have allowed for the removal of 2,000 cubic yards.

The rocky bed consists of stratified lime stone and is presumed to be similar in its character to that which forms the base of the dam at the head of Beauharnois Canal, and is laid bare for inspection below it. With the conveniences which the two side piers will afford for carrying on the operations, I apprehend no difficulty in removing the rock and boulders to any required depth.

I have had some correspondence with Messrs. Maillefert and Raasloff, Submarine Engineers of the City of New York, in reference to those proposed works, and have received from them a copy of a report (forwarded herewith) where their operations at Hell's Gate which have been so remarkably successful, and were characterized by a novel mode of blasting without drilling. They have made no offer as yet, but are ready to do so whenever called upon. However, with the double lifting scows and other appliances now available by the Commissioners, it is in their power to do this work without soliciting foreign aid, and the only question to be considered in its accomplishment is that of cost.

The south guide pier is intended to be 790 feet long by 15 feet wide—the upper part for 250 feet to be of solid crib work, and in its position slightly deflected from the channel toward the south, the remainder of it to be of detached cribs 15 x 30 feet, ranged in line and placed 60 feet apart, and thus forming a guide for the descending vessel.

The north pier is proposed to be 420 feet long and 15 feet wide, of solid crib work—both piers to be raised three feet above ordinary summer water, (see chart of Côteau Rapids.)

These improvements, which are estimated to cost about £5,000, will only remove the difficulty at the first pitch of the rapids, for after passing the deep water under Prisoner's Island, the channel is again lost in the great shoals which extend downwards fan-shaped, from the lower end of that island. The one navigated by the steamboats is 10 feet deep, and runs off obliquely towards the north shore, but from the quickness of the grade, and roughness of the water, it will be necessary to increase the present depth to about 13 feet, in order to give a safe draught of 10 feet. To accomplish this, I see no better plan than the one proposed by Mr. T. C. Keefer, which is to lay a long pier in the rapids obliquely with the current. (See the chart.)

The soundings which have been obtained are insufficient to make a proper or final location of this pier, but under any circumstances, they must be retaken before the commencement of the work, and therefore they are not now indispensably necessary.

The pier, which I propose, will be about 2,200 feet long, 18 feet wide and 15 feet in average height from its base.

The improvements, at the Côteau Rapids, are estimated to cost £13,143 8s 0d.

CASCADES RAPIDS.

These Rapids present many difficulties. The river between the old lock and the Buisson Point is half a mile wide, and there is a fall of 10 feet from the south to the north side.

The ledge of rocks under the rapids crosses it diagonally, and causes the current to run obliquely toward the north shore, but at the foot of this ledge, it is carried away again toward the south by a very deep channel leading in that direction.

The water above Buisson Point is nearly on a level with that at the Pointe à Coulonge, a mile higher up the river, but on the opposite side.

Down this rapid, the steamboat channel is intricate and encumbered on either side by threatening rocks, such as the Dog Reef, the Balise, and the Split Rock.

After passing these dangers, the channel becomes broad, and very deep for the space of a mile, and then breaks over another ledge of rocks where (at the Hay Stacks) the depth is limited to 9 feet. An improvement of these rapids was projected by Mr. T. C. Keefer in 1850, which was intended to remove all the difficulties at these two places at once. It consisted simply of a dam across the Raft Channel, extending from the head of Round Island, to the upper entrance of the old Military Canal, by that means turning the whole volume of the river into the main south channel and thereby increasing the draught in the rapids both above and below the island. A pier in the upper rapid was added to face off the Balise, and this completed the projected improvement.

Before submitting any plan, I found it necessary to ascertain as near as possible the effect such a dam would have upon the rivers, and for that purpose have gauged both channels. The soundings on the map give a sectional area of about 30,000 square feet for the main channel, a hydraulic mean depth of $13\frac{1}{2}$ feet, and a surface velocity of 14.078 feet per second.

The area of the north channel is 14,650 square feet, and the surface velocity 7.689 feet per second; according to these data, the volume discharged by the north channel is 93,760 cubic feet per second, and that by the south channel 353,650 cubic feet per second. When these two streams are united by the construction of the dam, the whole amount of 456,410 cubic feet per second must be discharged through the south channel, in which case there must of necessity be an increase of velocity and

depth. The hydraulic mean depth due to this augmented volume in the main channel will be 15.55 feet, and the difference between that and the present hydraulic mean depth of 13.33 feet, is 2.22 feet, which is the rise due to the increase of volume. The rise will not therefore exceed $2\frac{1}{2}$ feet, which is too little to have the desired effect upon the rapids.

Its influence would reach the foot of the first rapid, but would scarcely be appreciable at the middle or head of it, were it was more wanted.

Again at the Hay Stacks, it would exert a beneficial influence, but not sufficient to dispense with the necessity of adopting some further means of increasing the draught of water.

For the reasons just stated, I would not recommend the construction of the dam.

In the plan which I now submit, I propose to increase the depth simply by contracting the width of the river. If the stream be confined within narrower limits, it must necessarily rise, and the amount of that rise will be in proportion to the extent of the encroachments made upon its bed, by means of piers running out from the land, judiciously placed so as to back up the water from below, or turn in an additional volume from above; it is practicable to increase the depth to the desired extent without going to the expense of forming a continuous pier parallel with the bank of the river, which it is evident would be the most effectual mode of attaining the object.

It will be seen, on reference to the chart, that it is proposed to contract the river at the first pitch of these rapids to 1,700 feet in width, and at the second to 1,750 feet, and that all the piers take their start from the shore; therefore more easily constructed than if isolated in the current.

Pier No. 1 starts from near the head of the rapid on the north side, and extends out into the river, and downwards in a curvilinear direction, to cover the Balise, and contract the breadth of the river. It will be 1,700 feet long, 15 feet wide, and will be raised 5 feet above the present surface of the water, making an average height from bottom of 13 feet.

Pier No. 2, extending from the south side, is situated upon the smooth rock in the swift water above the Buisson Point. It is 800 feet long, 12 feet wide, and is to be raised 3 feet above the water, making an average height of 9 feet from the bottom.

Pier No. 3 is situated at the old lock, upon a ledge of rocks which extends out from it to the border of the channel. It is 700 feet long, 20 feet wide, and it is to be raised 8 feet above the present surface of the water, making an average height from bottom of 18 feet.

Pier No. 4 is to be placed at the head of Round Island, if required, for the purpose of assisting No. 5 and No. 6 in giving a sufficient depth above the Haystacks, but it is believed that the removal of about 200 cubic yards of rock from the channel at this place will render the construction of this pier unnecessary. It should, therefore, be left to the last, and not commenced until it was found to be indispensable. It is 600 feet long, 15 feet wide, and has an average height of 12 feet.

Pier No. 5 is based upon a flat rock extending out from the south shore, opposite the second pitch. It is to be 700 feet long, 15 feet wide, and to have an average height of 12 feet. The top to be raised 7 feet above the present surface of the water.

Pier No. 6, starting from the head of Cascades Island, extends southward towards No. 5, and leaves a water-way of 1,750 feet in width. It is to be 900 feet long, 15 feet wide, raised 5 feet over the present surface of water, and has an average height of 15 feet from the bottom.

These piers have been arranged with a view of giving generally a depth of 13 feet in the channel where the obstructions are found. In some places, however, such as Split Rock and the bar above the Haystacks, it is proposed to blast out the rocks to assist in forming a proper channel, and thereby to save pier work. The piers are intended to be built of ordinary crib-work, and filled with stones. They do not require any covering.

The cost of the proposed improvements at the Cascades Rapids is estimated at £13,926 10s. currency.

LACHINE RAPIDS.

These rapids, notwithstanding the quickness of the descent, and the violent agitation of the water, afford a sufficient depth for the intended draught of 10 feet, but in the great expanse of water between Laprairie and Nun's Island the direct channel is lost amongst the shoals with which it abounds. After passing the foot of the rapids, it bears off towards the head of Nun's Island where it is obstructed at low water by a bar formed of boulders, resting upon a rocky bottom, and arranged almost in the same direction as the current. Careful soundings were taken during the last winter by Mr. T. C. Keefer, under the authority of the Commissioners, for the purpose of ascertaining, as correctly as possible, the nature of this obstruction. I learn from him that he reported, on the 6th April last, and also transmitted a chart of the soundings taken at this particular place. I have procured a copy of his chart, and have marked thereon the improvements I now propose.

As all the soundings have been reduced to lowest water and show 10 feet of depth at that, I do not propose disturbing the rocky floor on which the boulders rest, because if these were removed the draught would seldom be limited to less than 10 feet, as it is not often that the water falls to its lowest stage.

To prevent vessels from being drawn by the cross current, upon the shoals on the lower side of the channel, or from falling into the "Cul de Sac" shown on the chart, and also to serve as beacons, I propose the construction of four detached piers of 40 feet long by 18 feet wide, to be arranged equi-distant from each other, upon the line drawn upon the plan marked A. B., being on the east side of the channel and extending over a distance of about 500 feet. They need only be raised a foot or two above the ordinary summer level, and thus be below the influence of the winter ice.

If at any future day it be found desirable, they can all be united together by more crib work of the same description and so form a continuous pier 150 feet long, which will be a still more perfect guide through this pass. I propose also the removal of the boulders for a space of 200 feet parallel with the line of the cribs by means of the double lifting scow and machinery now in the possession of the Department.

The removal of the boulders is estimated at	£500
The construction of the four cribs.....	500
	<hr/> £1000

In extreme low water, the narrow channel opposite Moffat's Island, by former soundings, was found to be only 9 feet deep, but, since the construction of the long wharf of the Champlain and St. Lawrence Railroad, the depth of this channel has been increased, and it is also probable that the construction of the St. Lawrence Bridge will have a still further beneficial influence upon its depth, so that any attempt, just now, to improve this part of the channel, would be premature and perhaps unnecessary.

The proposed expenditure for the improvement of the rapids, will therefore be as follows :—

At the Côteau Rapids.....	£13,143	8	0
“ Cascades “	13,926	10	0
“ Lachine “	1,000	0	0
Buoys between Prescott and Montreal.....	300	0	0
Superintendence and Contingencies.....	1,630	2	0
Total.....	£30,000	0	0

I would remark that no improvements have been projected for any of the rapids above Lake St. Francis, but it is not certain that they will afford, at all times, and with all winds, a clear draught of 10 feet for laden vessels.

It will not be until after the lower rapids have been improved and navigated by vessels of greater draught than those now using them, that their fullest capacity will have been ascertained.

Further improvements, not now anticipated, will doubtless be called for as the draught of downward vessels is increased by the facilities proposed to be afforded them, but for the present, the estimate above given is sufficient to overcome the main difficulties and prove what can be done towards their amelioration.

The details of the foregoing estimates are appended for the information of the Commissioners.

I have the honour to be, Sir,
Your obedient servant.

SAMUEL KEEFER,
Civil Engineer.

THOMAS A. BEGLEY, Esq.,
Secretary of Public Works.
Ottawa.

DETAILED ESTIMATE for improving the navigation of Rapids of the River St. Lawrence for descending vessels drawing 10 feet water.

AT THE CÔTEAU RAPIDS.

See the chart of these rapids.

Pier No. 1.

	£	s.	d.
250 ft. long by 15 ft. wide by 16 ft. high, average, 2,222 cubic yards at 6s.	666	12	0
600 ft. long by 15 ft. wide by 15 ft. high, average, 1,667 cubic yards at 6s.	500	2	0

Pier No. 2.

490 ft. long by 15 ft. wide by 15 ft. high, average, 4,089 cubic yards at 6s.	1,226	14	0
Blast and removing rock and boulders to afford a depth of 11 ft. at ordinary summer water, average 22,000 cubic yards at 2s. per cubic yard.	2,500	0	0
	4,893	8	0

Pier No. 3.

2,200 ft. long, averaging 15 ft. in height, and to be 18 ft. in uniform width, 22,000 cubic yards at 7s. 6d.	8,250	0	0
Total at Côteau Rapids.	13,143	8	0

AT THE CASCADES RAPIDS.

See chart.

Pier No. 1.

	£	s.	d.
900 ft. long by 15 ft. wide by 10 ft. high, average, 5,000 c. yds.			
200 " 15 " 17 " " 1,890 "			
660 " 15 " 13 " " 4,333 "			
Total at first pier.	11,223		
" at 7s.	3,928	1	0

Pier No. 2.

800 ft. long by 12 ft. wide by 9 ft. high, average, 3,200 cubic yards at 6s. 6d.....	1,040	0	0
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Pier No. 3.

700 ft. long by 25 ft. wide by 18 ft. high, average, 9,800 cubic yards at 7s. 6d.....	3,675	0	0
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Pier No. 4.

600 ft. long by 15 ft. wide by 12 ft. high, average, 4,000 cubic yards at 7s.....	1,400	0	0
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Pier No. 5.

700 ft. long by 15 ft. wide, by 12 ft. high, average, 4,667 cubic yards at 7s	1,633	9	0
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Pier No. 6.

900 ft. long by 15 ft. wide by 10 ft. high, average, 5,000 cubic yards at 7s.....	1,750	0	0
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Total for pier work.....	13,426	10	0
Blasting and removing rocks at the Balise and Hay Stacks.	500	0	0

Total at Cascades Rapids.....	13,926	10	0
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AT THE LACHINE RAPIDS.

	£	s.	d.
Placing four beacon or guide cribs on the east side of the channel at the head of the Nun's Island, according to the chart, 40 ft. long, 18 feet wide and averaging 15 ft. in height, each, and in all containing 1,600 cubic yards at 6s. 3d	500	0	0
Allow for the operation of the lifting scows engaged in removing boulders from the channel.....	500	0	0
Total	1,000	0	0

ABSTRACT ESTIMATE.

	£	s.	d.
Côteau Rapids.....	13,143	8	0
Cascades Rapids.....	13,926	10	0
Lachine Rapids.....	1,000	0	0
Buoys between Prescott and Montreal.....	300	0	0
Superintendence and Contingencies.....	1,630	2	0
Total.....	30,000	0	0

SAMUEL KEEPER,
Civil Engineer.

MONTREAL, 25th May, 1883.

MONTREAL, 25th May, 1883.

SIR,—I have the honour to forward herewith my final report upon the improvement of the rapids of the St. Lawrence, as called for by the Commissioners, together with a detailed estimate thereof, the charts of the Côteau and Cascades Rapids made by Mr. Stewart, and those of the Côteau, Cedars, Cascades and Lachine Rapids prepared under the direction of Mr. T. C. Keefer.

The charge for this report is £50 (fifty pounds).

There is also a balance of £76 3s. 11d. due me upon the railway survey, as stated in my letter of the 7th April last. Permit me then to solicit the favour of the Commissioners attention to these accounts, and to observe that an early settlement is desired.

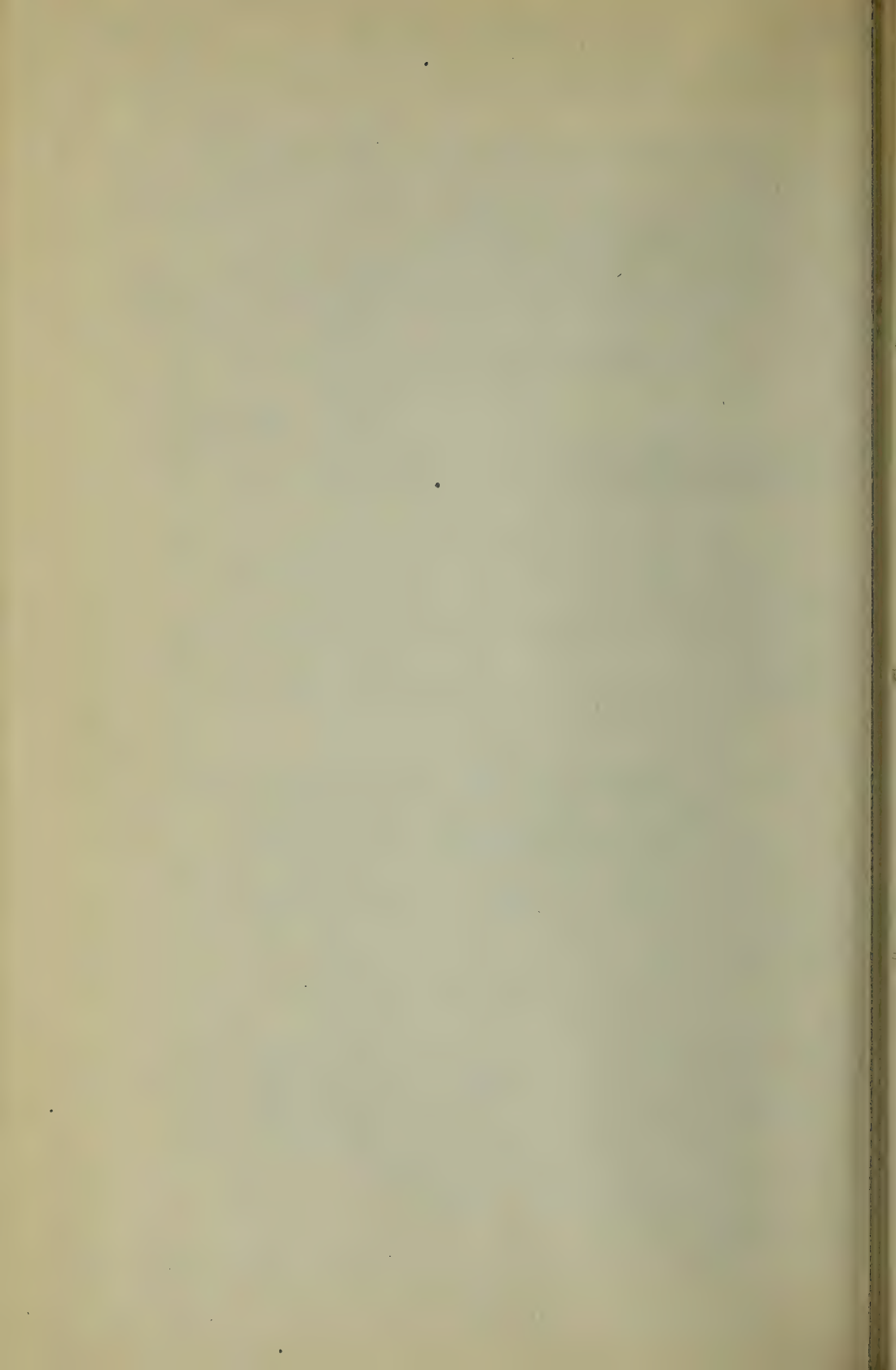
I have the honour to be, Sir,

Your obedient servant,

SAMUEL KEEFER,

Civil Engineer.

THOMAS A. BEGLEY, Esq.,
Secretary of Public Works,
Quebec.



APPENDIX No. 14.

REPORT ON TORONTO HARBOUR,

WITH RECOMMENDATIONS AS TO THE IMPROVEMENTS WHICH SHOULD BE MADE, BY CAPTAIN JAMES B. EADS, C.E.; ALSO MEMORANDUM BY MR. H. F. PERLEY, CHIEF ENGINEER, DEPARTMENT OF PUBLIC WORKS, GIVING A DESCRIPTION OF THE HARBOUR, AND OF THE DIFFERENT SURVEYS MADE OF IT, &c.

APPENDIX No. 14.

REPORT ON TORONTO HARBOUR, ONTARIO

BY JAMES B. EADS, C.E.

SIR,—I have the honour to submit the following Report upon the Harbour of Toronto.

Before making a personal inspection of the harbour, I expressed the wish that I should be furnished with such information relating to it as would be useful in a study of the questions upon which my advice was desired. In response to this request I have received a compilation of the available records touching the harbour, entitled: "Memorandum with accompanying plans and documents relating to the past and present state of the Harbour of Toronto," and at the same time I received the following letter:

No. 6532, Subj. 13.

" DEPARTMENT OF PUBLIC WORKS, CANADA,
OTTAWA, 19th April, 1881.

" SIR,—The preparation of the information you desired to have relative to the Harbour of Toronto, prior to the examination you are to make, having been completed, I now enclose the same in pamphlet form, and am directed by the Honourable the Minister to request you to proceed with such examination at your earliest convenience.

" There are two points which will demand your serious consideration:—

" 1st. The western entrance—its proper width and depth, and the means to be adopted to maintain both, as well as to restrain or prevent the growth of the island shoal northwardly and westwardly either by works erected at the entrance or from the island, or both.

" 2d. The eastern entrance, — whether it is desirable that it should remain open; if so, the means to be adopted for its maintenance to an ample width and to a depth equal to that of the western entrance. If it should be closed, the manner in which this should be accomplished and its future maintenance provided for.

" You will be kind enough to report fully on these points, as well as on all others having a bearing on the preservation or improvement of the harbour which may be brought to your notice during your examination, such report to be accompanied by plans and estimates of the cost, and such suggestions as you may be pleased to make.

" Although your attention is called to certain points for investigation, it is the wish of the Minister that your report shall be full and comprehensive and embrace every thing which may have a bearing on the object of your enquiry.

" You will please notify the Chief Engineer when you propose visiting Toronto.

" I have the honor to be, Sir, your obedient servant,

(Signed)

" F. H. ENNIS, Secretary."

The Memorandum and its appendices contain a mass of important information upon the subject in hand, which will be found very useful in forming a correct judgment as to the merits of any system of works which has been or which may be suggested for the benefit of the harbour. But as the careful examination of these facts *in extenso* may be inconvenient when this report is under consideration, and as they constitute a part of the evidence by which I have been guided, I think it proper

to append to this report a copy of the Memorandum, as it contains in a compact form the gist of the information which is embodied in the entire volume.

During the latter part of last June, I visited the City of Toronto and met the Chief Engineer, Mr. Henry F. Perley, there by appointment. Through his courtesy, I was provided with every facility necessary to enable me to make such an inspection of the harbour and its vicinity as I desired. During my examination I was accompanied by the Chief Engineer, and by Mr. Kivas Tully, Engineer of the Harbour, and from these gentlemen I obtained, verbally, much useful information. Mr. Tully's knowledge of the harbour is the result of many years of close and intelligent observation of its phenomena, while residing in Toronto. During my visit I made as thorough an inspection of the harbour as I desired, and fully informed myself as to the causes which in my opinion have produced its deterioration.

As no instrumental survey of the harbour had been made since 1879, and as an accurate knowledge of the most recent changes in it was important, not only in arriving at a correct solution of the problem, but also in making an accurate estimate of the cost of the works needed for its improvement, I requested that another survey should be made with especial reference to the changes which had occurred in its two entrances, where works of improvement would probably be located. This survey the Chief Engineer caused to be made during last July and August, and I have been furnished with the results. I am therefore in possession of all of the information requisite for an intelligent and thorough study of the subject. This study I have made and I trust that I shall succeed in presenting to the Dominion Government, in as convincing a light as they are presented to my own mind, the several reasons that have induced me to make the recommendations herewith submitted. To aid me in this part of my task, I desire to impress on the memory of the reader each one of the three facts presently named, which appear to me to be the most important phenomena in the consideration of the very novel problem presented by the Harbour of Toronto.

First. There has been for nearly a century a constant growth of the northern end of the peninsula in the direction of the Queen's Wharf.

Second. Although this extension has diminished the *width* and *depth* through the entrance or throat of the harbor, it has not materially altered the *distance* which existed sixty-three years ago between the deep water immediately inside of the harbour and that near the entrance on the outside of it.

Third. While the crest of the extremity of the peninsula has advanced about 1,700 feet to the west in the last sixty-three years, its submerged face on that side has greatly receded, and the deep water of the lake along its western shore has proportionately moved to the east, thereby resulting in a much steeper slope on this side of the peninsula, to the depth of at least 18 feet, than it had in 1818.

These three facts are so important that the proof of each one, in order, is herewith submitted.

In proof of the *first*, we learn that in 1788, Mr. J. Collins, Deputy Surveyor-General, reported the navigable channel for vessels to be 1,500 feet wide and from 18 to 20 feet deep. The waters of the lake at the time were as he says very high. The survey of Bouchette, 5 years later, shows only 15 feet as the maximum depth and a channel 480 yards wide. Much of this difference in the maximum depth and width and that reported by Collins, was doubtless due to the different level to which Bouchette referred his measurements.

In the very interesting and instructive competitive report of Mr. Sandford Fleming, C. E., (page 64 of the appendix to Memorandum), we find the following statement:

"On comparing the charts of Bouchette, Bayfield, and Bonnycastle with my own from a recent survey (in 1850) showing the state of the peninsula at the present time, we obtain results as follows:

"First—That the channel between ten (10) feet water lines was, in

"1796, about 480 yards wide,

"1828, about 310 yards wide,

" 1835, about 260 yards wide,
" 1850, about 120 yards wide."

This comparison is entitled to much confidence, for the reason that it was evidently made by a careful and intelligent engineer, who had within reach at Toronto at that time, the necessary data to determine the difference in the lake levels to which these several surveys were referred, and without which information no very accurate comparison of these surveys could have been made.

From these comparisons, and from his estimates, Mr. Fleming arrived at the conclusion, that the northward growth of the peninsula reduced the width of the channel at the rate of from seven to ten yards annually, and that this required a deposit of about 11,000 cubic yards each year. The annual growth during the years embraced by his comparison is shown to be remarkably constant and regular.

On the 11th of April of this year, as appears by the chart of comparative surveys from 1875 to 1879, inclusive, the width between the Queen's wharf and the ten-foot contour line on the peninsula was only about 225 feet, and much of this width is, no doubt, due to dredging.

The *second fact* is shown by a comparison of Mr. Fleming's survey of 1850, with the most recent one made this year. The 15 feet inside and outside contour-lines on the latest survey, measured across the end of the peninsula where they approached each other most nearly, are about 2,400 feet apart.

In comparing the latest contours with the 15-foot contours of Mr. Fleming, it should be observed that there are two 15-foot soundings on his chart in the bight of the outer curve which are not embraced by it. If the curve were drawn through the outer one of these, which it might be with equal propriety, the line would be moved out about 420 feet. The distance would then be about 2,200 feet between the two 15-foot contours on Mr. Fleming's chart, if measured over the line of least distance between the same contours on the survey of 1881. This line crosses the end of the peninsula about 1,350 feet from the end of the Queen's wharf. On a line nearer to the Queen's wharf the distance between them on Mr. Fleming's chart is only about 1,800 feet. The lesser distances between these contours on Mr. Fleming's survey are owing to the higher datum plane from which the depths were measured. He says (p. 69, Memorandum and Appendix) that his report was "chiefly founded on a very laborious and expensive survey between August, 1849, and the spring of 1850." With regard to the datum level, he says:

"These soundings amount to between two and three thousand, and are reduced to an approximate mean level of Lake Ontario, ascertained in conjunction with Captain Letroy from a series of lake levels taken by his direction during several years."

This level is, I believe, about one foot and a half higher than the present datum established by the late Captain Hugh Richardson in 1850. The hydrographic diagram of Mr. Kivas Tully shows the mean level of the lake during twenty-five years ending in 1879 to have been 18.20 inches above the present datum plane.

No material difference is observable between the last survey and that made by Mr. Fleming thirty years ago in the width of the shoal between the 15-foot contours at the locality named, when the discrepancies I have alluded to are duly considered. That this distance has not appreciably altered in the last six years admits of no question, when the survey of 1875 is compared with that of 1881.

In still further proof, it is proper to quote the following from the report of Mr. William Kingsford, engineer in charge, dated July 7th, 1875, who seems to have been a close observer of the changes in the harbour and its entrances. He says (page 110, Memorandum and Appendix): "The eastern spit of land which protects the harbour is formed of sand, much of which is frequently in motion. It has been asserted that, carried away from the original place of deposit, it finds its way into the harbour. The examination of last year proves that such is not the case. There is no less depth of water to-day in the inner harbour than is shown on the map of the first survey made by Bouchette in 1785."

The proof of the *third fact* referred to will appear by making the following comparison of Bayfield's survey with the survey of 1881. Draw a line upon each from the light-house to the centre of the Queen's wharf, and from points on this line measure, perpendicularly to it, the distance to the 2, 4, 10, 15, and 18-foot soundings shown on Bayfield's chart near the central part of the western face of the peninsula; and compare those depths with the depths at the same places on the chart of 1881.

First. At a point on the line 4,500 feet from the light-house we find it is about 1,900 feet to the most southerly one of the two-foot soundings. At this place on the survey of 1881, the depth is now 13 feet greater.

Second. At a point on the line 5,600 feet from the light-house it is 1,500 feet to the next two-foot sounding on the Bayfield chart. At this place the depth is now 6 feet greater.*

Third. At a point on the line on the Bayfield survey 4,000 feet from the light-house it is 1,400 feet to the southern four-foot sounding. The depth here is now 2·7 feet greater.

Fourth. At a point on the line 4,300 feet from the light-house it is 1,200 feet to the other four-foot sounding. The depth at this place is now $1\frac{1}{2}$ feet greater.

Fifth. At a point 4,750 feet from the light-house it is 2,000 feet to the ten-foot sounding on Bayfield's chart. At this place the depth is now 9 feet greater. The ten-foot contour here has receded 400 feet.

Sixth. At a point on the line 5,000 feet from the lighthouse it is 2,000 feet to the fifteen-foot sounding of Captain Bayfield. At the same place the present depth is 4 feet greater. The fifteen-foot contour has receded here about 200 feet.

Seventh. At a point on the line 5,200 feet from the light-house it is 2,050 feet to the eighteen-foot sounding on Bayfield's chart. The present depth here is about 2 feet greater.

These comparisons are sufficient to show that the five-foot contour line about the middle of the western face of the peninsula is at very nearly the same place now that it was sixty-three years ago, while the contours between five feet and eighteen feet have greatly receded.

A further comparison of Captain Bayfield's survey with that of 1881 will prove, by similar measurements, that the dry crest of the northern end of the peninsula has not only advanced to the north, but has likewise advanced to the westward about 1,700 feet from the end of the sand spit shown on Captain Bayfield's chart, by which the western face of the peninsula above the five-foot contour line has been much steepened by a movement precisely the converse of that which has steepened it below that depth. The sand which constituted the bottom beyond the present five-foot contour line in 1818 out to the depth of eighteen feet, has evidently been transported by the action of the waves up to the northward and on to that part of the western face of the peninsula which is now above the present five-foot contour. This process has greatly steepened the western face of the peninsula without really advancing it lakeward.

If comparisons be made further southward on the face of the peninsula, the change wrought by wave action in this direction will be still more marked. For instance, at a point on the line from the Queen's wharf to the lighthouse, 2,600 feet from the latter, the Bayfield chart shows a depth of but 3 feet on the outer face of the shoal at the distance of 2,600 feet. The depth here must now be about nineteen feet, as the spot is about 100 feet outside of the outermost sounding on the chart of 1881, where a depth of 18·5 feet is recorded. The depth of three feet is now 1,600 feet eastward on the survey of 1881. If we assume that the plane to which Captain Bayfield reduced his soundings was eighteen inches higher than the present datum, it would still show that the three-foot contour at this locality is 1,550 feet further landward than it was in 1818.

* Note—This latter two-foot sounding and others on the same shoal are shown more distinctly on an engraved chart of Bayfield's survey published, "with corrections", in 1863. They are scarcely discernible on the photo-lithograph published with the memorandum.

From this and other comparisons which may be made between these two surveys, it will appear that while the top or dry part of the peninsula at its northern end has apparently swung out towards the lake about 1,700 feet westwardly, the submerged portion of it at the southern end of this face, has, to the depth of eighteen feet, swung in towards the light-house about the same distance eastwardly. The common centre about which these changes seem to have vibrated from east to west, is located near the central portion of the western face of the peninsula. The centre about which the vertical movement has occurred by which the entire face of the peninsula has been steepened, seems to have been at the depth of about five feet, and at a point also near the central part of the western face of the peninsula. In this movement the eighteen-foot contour at the northern end has not materially changed its location, while the zero margin of the lake at the other end, immediately west of the light-house has been almost if not quite as stable.

The prolongation of the isthmus northwardly and the alteration of its western face are unquestionably due to wave action, and, as a proper understanding of the phenomena produced by waves is absolutely necessary to enable the reader to form an intelligent judgment of the merits of the conclusions arrived at in regard to the causes of the changes which have occurred at the harbour of Toronto, and of the probable results of the remedial works herein proposed, I will be pardoned for explaining the manner in which the waves affect the sand and other materials composing the bottom of seas, lakes, etc.

A simple illustration of the action of waves on the surface of *very deep water* can be made by tightly stretching a long cord between two points and then striking it near one end. The wave produced by the blow travels rapidly back and forth along the cord from end to end, but the material of which the cord is made simply rises and falls without advancing with the wave. So it is with the *water* where the lake is deep. The wave may pass over so rapidly, but, it cannot of itself set up any continuous horizontal motion in the water. A bird or a buoy afloat upon it would simply rise and fall as the waves passed under it. At the same time it would have a slight motion to and fro in the direction the waves are travelling, but unless impelled by the wind or a current in the lake, it would remain in the same locality. The case is quite different, however, when the wave reaches water so shoal that the bottom resists the sinking of its crest. When this resistance is felt, the water which at that moment constitutes the wave, has, as a result of this resistance and of its own momentum, a horizontal motion imparted to it. This horizontal impulse becomes still greater as the depth lessens. Hence, although the velocity of the wave itself is diminished as it reaches shoaler depths, the water through which it passes has a constantly increasing velocity imparted to it in the direction of the shore, and in the case of big waves it becomes so swift that it is driven with great force out upon the beach.

This translatory motion gives to the waves the power to take up from the sea bottom, or to set in motion, the sands, shells and other materials of which it is composed, and to transport them shoreward with more or less force. The quantities thus transported depend upon the size of the waves, the formation of the shore upon which they exert their force, and the size, gravity and abundance of the material acted upon.

The direction of these translatory currents is determined by the shape of the sea bottom. If the shore be precipitous, very little or no such current will be created; but where the bottom is sloping to the sea, the waves will be constantly directed shorewards, no matter how obliquely they may approach it. Hence, waves on such shores are continually piling up reefs and beaches, and through some of these every river must struggle to reach the sea, unless it enter it between bold headlands, and is incapable of transporting enough detritus to form a delta at its mouth; or unless some sea current exist sufficiently strong to sweep away the sedimentary matter brought down by it. Of course the height of the wave determines the depth at which the resistance of the bottom is felt, and at which the horizontal motion of the water is first induced. This depth will therefore be the extreme limit at which the material of the bottom can be set in motion by the wave. A study of the surveys

which have been made on the western shore of the isthmus at Toronto satisfies me that the waves which roll in upon it are not large enough to move the sand when the water is over 18 feet deep. I can discover no evidence that the bottom has been disturbed at a greater depth there during sixty-three years; and the area within which the waves are formed that break upon it forbids the belief that they are large enough to affect the bottom at a greater depth. The magnitude of a wave does not depend so much upon the force of the wind as upon the "fetch" or distance through which it can travel without interruption, and the depth of the water on which it moves.

Waves travel much more rapidly in deep than in shallow water. This is the cause of the phenomenon called "breakers." As each wave approaches still shallower water, its speed becomes still more retarded, hence the wave behind is always moving more rapidly than the one in advance. As it gains upon its predecessor it gets the benefit of the deeper water of that wave. The result of this is that at regularly recurring intervals or rhythmic periods, one of the waves completely overtakes the one in front of it, by which it secures for itself a still greater depth and maintains the velocity due to that depth. This enables it to travel so rapidly over the one it has surmounted, that it outstrips it in the race and consequently falls over in front of it, or, as it is termed, "breaks."

The wave has more ability to carry the sand up on to the beach than it has to bring it down again, notwithstanding the slope of the shore. This is because the ratio of frictional resistance of the shore increases as the depth of the water passing over it is diminished; and also because the material carried up on to the beach is almost wholly suspended in the water. The interval of time required for the shoreward current to come to rest, and for the return current to be started, is sufficient to permit the sand to fall to the shore, from which the less rapid current seaward is unable to move it.

A very important part of the study of our problem is involved in the inquiry as to whether the portion of the isthmus now constituting an island is undergoing any serious alteration in its size. Is it being added to? or is it diminishing? We know that its form has been altered, to the serious injury of the channel, by the extension of the peninsula northward. It is a matter of great importance to know whether the material which has been added to the end of the peninsula in the last 63 years has been brought from Humber Bay, Scarborough Heights or elsewhere, or whether it has been transported from the south-western portion of the peninsula itself.

If it has been brought from the eastern shore of the Lake, from Humber Bay or Niagara, we must look for an annual contribution of the same kind indefinitely, from such foreign source, and this fact would thrust into any plan for the improvement of the western entrance a very embarrassing element. This material would accumulate about the entrance to our works, to such an extent as to need annual dredging and probably an extension of the necessary piers from time to time. With such a prospect I should not hesitate to advise that the western entrance be abandoned and that the remedial treatment, although much more expensive, be at once applied to the eastern gap. It is, however, only necessary to make an approximate estimate of the amount of material which has been removed from the western face of the peninsula, near Gibraltar Point, northward, and within a distance of about 2,000 feet westward from its present margin, to know that the immense quantity of sand which covered the lake bottom over this area in 1818, and which has now been removed by wave action, was quite sufficient to have transferred the crest of the peninsula 1,700 feet westward in the shallow depths then existing, and to have added to its length all of the material which it has received during the last 63 years, without any contribution from foreign sources.

I have made some approximate estimates of the quantity of sand which has been removed from this area during the last sixty-three years. On the large chart accompanying this report, which is a copy of the survey made by Mr. F. M. Hamel in 1881, will be found a line drawn from the light-house to the Queen's wharf, with four lines at right angles to it. These are designated as "A. B.," "C. D.," "E. F." and

"G. H." In comparing the sections, as nearly as possible with those similarly located on Bayfield's chart, I find that south of line "A. B." in the last 63 years there have been removed about six million cubic feet. Between lines "A. B." and "C. D.," sixteen million two hundred and fifty thousand feet. Between "C. D." and "E. F.," eighteen million, seven hundred and fifty thousand feet. Between "E. F." and "G. H." five million one hundred thousand feet, and north of line "G. H." one million four hundred thousand cubic feet, making, in all, forty-seven million five hundred thousand cubic feet; or, one million seven hundred and sixty thousand cubic yards. This is at the rate of about twenty-eight thousand cubic yards per annum; an amount amply sufficient to account for the northward growth of the peninsula and likewise for the westward advance of the crest of it. The data are not sufficient to enable me to determine what amount of it has been deposited to the eastward of the line between the Queen's wharf and the light-house, but it is evident from the foregoing that no addition from any foreign source has been made to the northern end or western face of the peninsula since Bayfield's survey. The changes which have occurred on the western face of it give substantial assurance of the permanency of the western entrance to the harbour, if it be located in accordance with the recommendations hereinafter made.

No grain of sand rests upon any part of the shores of the peninsula, or in the channel, that was not brought to its present resting place by a current of water which left it there because it was not able to move it farther. The slope of the shore is therefore the result of an equilibrium between the force of the currents which sweep over it, and of the opposing force of gravity in the sand. The slope which the shore assumes under these different forces is termed, in technical parlance, its "angle of repose." Owing to the greater mobility of the sand when saturated, this angle is flatter or lower on the submerged part of the shore than on the dry reefs or beaches. When a broad channel is exposed to storms and is swept by violent waves in different directions, the bottom becomes still flatter. Hence the angle of repose assumed is so low that any natural channel through such deposits on the sea coast must possess great width if it have any considerable depth in its central part. This will be better seen when it is remembered that it is about 1,200 feet from the shore line on the western face of the peninsula out to 16 feet of water, although this shore is under the influence of wave action which is quite favorable for the maintenance of a steep angle of repose. A natural channel therefore, if formed of the same materials which I assume to be almost wholly of sand, would, if it were possible to have its opposite shores swept by similar waves, require to be 2,400 feet wide to maintain a central depth of 16 feet. In a narrow and sheltered channel the sand would maintain an angle of from four to six horizontal to one vertical, or about eleven degrees. The perimeter of the cross section of a channel swept only by currents moving in directions parallel to its axis, conforms very nearly to the arc of a circle.

The ability of a river to carry the detritus with which its water is charged, is due to the velocity of the current. When it reaches the sea the current subsides, and the sediment, before held in suspension, is deposited. The sea waves leach out by continual agitation the argillaceous and other lighter portions of these deposits, while the sand, gravel and heavier materials are left to dam back the river and form the foundations upon which it in turn builds up its bank still further out. Their low slopes defy the fury of the waves, and if any littoral (or shore) current prevails in the sea where the river is thus extending its banks, this current carries the river deposits to the leeward, builds up that bank more rapidly than the other and compels the discharge finally to flow in almost direct opposition to the prevailing sea current. In this way a river will extend its banks out many miles into the sea, its direction being determined by the littoral current or by the prevailing winds. The Mississippi has thus extended its length about sixty miles out into the Gulf of Mexico beyond the present shore lines of the gulf, and its course has been almost directly against the direction of the prevailing winds. As the river extends itself into the sea, its banks on the mainland are continually being raised by the annual overflows. These deposit the heavier materials carried by the current close to the river, while the

lighter portion, which takes longer to settle, is carried back to the swamp lands. In this way many silt-bearing streams, the Mississippi, the Rhine, and the Po, for instance, have, as they approach the sea, build up their banks many feet higher than the lands on each side of the river.

The direction which rivers take when their channels are built out in the sea, is frequently such as to almost completely enclose extensive bays. After such process has been carried out to a greater or less distance in the sea, the height of the river on the mainland becomes so great that a breach finally occurs in the seaward bank during some extraordinary flood, and the river then takes the shorter way through to the sea. In such case the channel which it had constructed below the breach is abandoned. Being no longer a conduit for the fluvial current, it is filled up by the action of the waves, and at the same time the height of its banks is reduced to the sea level or below it, and what the river constructed finally becomes the foundation of a peninsula, on which every evidence of the fluvial channel above the surface of the sea is completely obliterated. The Vistula, Adour, and Senegal, are among the numerous examples of rivers forming such new outlets to the sea, many miles above their former mouths. The long, narrow peninsulas which separate the Frisches Haff and the Curisches Haff in Eastern Prussia from the Baltic, no doubt had their origin in the extensions of the Vistula and Pregel into that sea.

A peninsula thus formed, having its axis parallel to the prevailing winds, receives constant additions by wave action upon its extremity, which continue to extend it, generally, though not always, against the wind. If a constant current of the sea sweep along its side in the direction of the end of the peninsula, the accretions thrown up by the waves in storms on the side of it are gradually transported along in calmer weather, toward its extremity. The side is thus kept steeper and prevented from widening, while the sands thus removed fall to the bottom again in the more sluggish current, or eddy, which exists at the end of the peninsula. Here an extensive shoal forms during the calmer weather, to be afterwards thrown up on it by the force of the waves. The sandy breakwaters which enclose the long series of extensive sounds on the coast of Virginia, the Carolinas and Florida, are examples of this kind of peninsula formation. The same process is carried on in tideless seas, though not in such vast extent. The Baltic, Mediterranean, Black Sea and the Great Lakes present many examples of such phenomena.

The sea currents almost invariably carry more or less sand along the shores, and thus furnish the material for the waves to extend the peninsulas. If the source of supply of this material be from any cause exhausted, the growth of the peninsula becomes checked. In such case the long, low slope at the end of the peninsula, under the influence of the waves, may not only be thrown up against it and be greatly deepened, but the end of the peninsula may be made by such influences to change its direction under the oblique force of the waves, in the manner of the Toronto peninsula. An example of a peninsula built out from a headland many miles across a large bay, and stopped in its growth when only half way across, may be seen in the Gulf of Danzig in the Baltic.

The longitudinal growth of a peninsula is checked when it approaches a headland of the main shore, by the pulsations which occur in the basin or harbour enclosed by

Where tidal action exists the basin is filled and emptied twice a day * through the channel between the end of the peninsula and the mainland, and the further encroachment of the peninsula upon this channel is arrested by the currents which sweep through it upon every ebb and flow of the tide. The higher the tide rises, and the bigger the basin which is filled and emptied, the greater will be the magnitude of the channel thus maintained. When the peninsula has reduced the width of the channel to the size absolutely required for the entrance and exit of the tidal water, the channel becomes permanent.

As the magnitude of a channel thus formed is wholly dependent upon the quantity of water which flows through it, it is evident that the quantity must be diminished if

* NOTE.—The Gulf of Mexico is an exception to this rule : the tide there rises but once a day.

a breach occurs in the peninsula, as a portion of the water which would otherwise serve to maintain the channel and stop the growth of the peninsula is lost through the breach.

I think it altogether likely that the Toronto peninsula had its origin in an extension of the River Don westwardly from the south-western point of Ashbridge marsh. It is not necessary to sustain such hypothesis, that its ancient channel should have extended through any considerable length of the peninsula. The root of the peninsula being thus formed throughout a distance of a few hundred feet, would be a sufficient nucleus upon which the waves and the current of the lake would concentrate a great part of the sand lying within a few miles of it in water less than eighteen feet deep. To do this the easterly gales doubtless contributed a large portion of the detritus from the ancient Scarborough Heights. The prevalence of the south-westerly gales will explain the cause of the change of direction which the peninsula has taken at Gibraltar Point without the Don having ever extended its channel through that part of the peninsula. To the wave action resulting from easterly storms must be attributed the constant growth of the eastern end of the island. This growth will be seen by a comparison of the last survey with those of older date.

It is not, however, necessary to penetrate the mystery which enfolds the creation of the peninsula. Its continual advancement to the northward conclusively demonstrates the fact that the filling and emptying of Toronto Harbour under the influence of the winds, the rise and fall of the lake and the discharge of the Don, have not been sufficient to arrest the growth of the peninsula in this direction, and the breach at Privat's Hotel which occurred about thirty years ago has made the current pass through the main channel, since then, still more impotent to check its northward advance.

It is exceedingly difficult to declare with any certainty what is the great magnitude of channel that can be maintained permanently through the main entrance to the harbour without dredging, even if the eastern gap were closed. The annual rise and fall of the lake is a very slow process, as well as a very irregular one, and produces but little current through this channel. The rise and fall of the water in the harbour under the action of the winds and storms is the chief source to which we must look for the necessary force of current to maintain the channel.

With a tidal basin regularly filled and emptied every day, and a permanent cross-section of channel as a resultant to guide him, the engineer can calculate with great accuracy the increased depth which he can secure by the construction of parallel works to reduce its natural width; but at Toronto the facts prove that the dimensions of the main channel are not permanent, nor are they wholly the results of the currents passing through it, but of the incomplete inclosure of the harbour by the peninsula. In other words, the western channel was originally an open roadstead. The peninsula has been, and is now, gradually converting it into a channel of permanent dimensions. If this natural process proceeds, it will reduce the dimensions to those which the tidal action or pulsations of the basin enclosed by the peninsula absolutely require for the exit and entrance of the lake water. It will then preserve that size with comparative permanence. Such channel, uninfluenced by artificial causes, would be shallow and wide, owing to the low angle of repose which the sands that form its bed naturally assume. If this process were completed, the engineer would know, by the natural cross-section of channel permanently established, what additional depth could be secured and maintained through the works he would build to contract it; because the tidal action will insure the maintenance of a cross-section of area sufficient for its accommodation, and if he contracts that area in width, the tidal force will recover a portion of it by increasing the depth through the works, until such area of cross-section is made large enough to establish a new condition of equilibrium or permanence, between the force of the current and the resisting force of friction of the bed and the gravity of the materials of which it is formed. Nothing short of some unusual convulsion of nature could close up the channel between the lake and a basin so large as the Toronto Harbour, if but one channel existed.

stead of one there were many into the harbour, they would each be shoaler, and in such case a long continuance of a low lake level would make them all unusually shallow, and render them liable to be shut up by wave action which would thus convert the harbour into a lake.

We have, however, in the comparatively stable condition of the inferior channel through the breach a reliable basis for the belief that a channel of sufficient width and depth for the commercial wants of Toronto can be permanently maintained without dredging, simply by the currents resulting from the oscillations of the water in the harbour, if but one channel be permitted. The channel through this gap has now a central depth of about four and a half feet and a surface width of about nineteen hundred feet, when the level of the lake is at zero of the gauge. This is equivalent to a cross-sectional area of nearly four thousand feet or of a channel two hundred feet wide and twenty feet of central depth. This channel has been maintained wholly by the currents that pass through it. If the main entrance were completely closed it is safe to assert that it would have been much deeper and proportionately wider.

If it be supposed that the channel through the breach has been maintained by a current sweeping through it, and through the western entrance, at the same time and in the same direction, that is to say, in through one and out at the other, and not by currents induced by the pulsations of the harbour, it is to be answered that such a current would not have the velocity of those currents which result from maximum differences of level between the surface of the harbour and that of the lake. A wind blowing continuously from the southeast would have the effect of creating a current through the gap which would flow out of the western entrance, but the same wind would raise the level in Humber Bay at the same time and thus check, if it did not completely arrest, such current. The strongest currents which would flow through the gap without establishing a counter under-current would probably be induced by winds from the south or southwest. These would elevate the surface in Humber Bay to a greater degree than at the gap. Their effect upon the water on the south shore of the peninsula would be to create a current towards Scarborough Heights, without materially affecting the level of the surface at the gap. Storms from the east undoubtedly have the effect of creating considerable current through the gap into the harbour. Of opinion, however, that currents thus created through the gap cannot have the velocity and scouring power which the under-currents hereafter referred to would possess.

The currents which are induced by a rapid rise or fall of the lake, will have their velocities determined by the slope of surface through the channel, (or fall per mile), and by the amount of frictional resistance of the bed of the channel. It is evident that when an alteration occurs between the surface levels of the lake and the harbour, the steepness of the slope through the channel will be increased in proportion as its length is diminished. The slope of the surface creates the current and the friction retards it; hence it is of prime importance that the channel be kept as short as possible. When the currents are the result of winds prevailing for several days in a direction to fill or empty the harbour an under-current must always exist through the channel in an opposite direction to that which is seen on its surface, provided all other openings from the lake into the harbour be closed.

It is impossible for an east wind to sweep over the harbour for an entire day without creating an outward surface current through the proposed channel, supposing the breach at Privat's Hotel and all communication with Ashbridge's bay to have been closed. This current will continue to exist so long as the friction of the air sets the surface water in the harbour and channel in motion, and it is impossible that the water should continue for any considerable length of time to flow out of the harbour in the direction of the wind, without lowering its surface level. A counter current of equal intensity will then be created below the surface current in the channel. This under-current will be the result of hydrostatic pressure induced by the greater height of surface outside of the harbour.

I should hesitate to advise the construction of a channel of greater dimensions than three hundred feet in width and a central depth of eighteen feet below the present

datum plane, although I am not prepared to say that one of greater size cannot be maintained without dredging after it be once completed.

A channel of the dimensions named can be constructed either at the breach on the peninsula, or at the western entrance to the harbour, with nearly equal assurance of its permanence. The question therefore, as to which locality shall be selected for the channel, should be determined mainly by the relative advantages which each would possess for navigation, and the relative cost of each. These are both decidedly in favour of the western location.

So far as to the safety and ease with which vessels could enter either one of the channels during bad weather, there can be no doubt that the preference is more decidedly in favour of the western entrance. Owing to its peculiar position, the entrance is completely protected from storms from every quarter except the south-west. To connect the deep water on the two sides of the peninsula by the shortest route, requires the location of a channel nearly parallel to the direction of the storms; therefore, vessels arriving in such weather would be able to sail directly into the channel and proceed at once to the harbour.

I have laid down upon the general chart of the harbour, (No. 1), the lines upon which the works that would be required for the improvement of the eastern gap should be located, if such improvement were deemed more desirable than that of the western entrance. These are shown in dotted lines, and will be readily found on the map. Where these lines are double, the works would need to be equally as strong and costly as the breakwater required on the south side of the western entrance. In addition to the works at the gap, its improvement would necessitate the complete closure of the western entrance by a dyke from the Queen's wharf to the end of the peninsula, as shown also with dotted lines.

On comparing the length of these several lines of works with those hereinafter recommended, (the location of which is shown in solid lines on the map), it will be seen that the improvement of the eastern gap would require 4,840 linear feet of heavy work, including 400 feet of the Queen's wharf dyke, and 6,220 linear feet of light work; while the western entrance will require only 2,745 linear feet of heavy work and only 7,403 linear feet of light work.

In this comparison it is assumed that 800 feet of the landward end of the breakwater, and 1,040 feet of the Queen's wharf dyke, will be of light work. Therefore 2,095 feet less of heavy work, and 1,123 feet more of light work, will be required to improve the western entrance.

The amount of dredging required to make the eastern channel would likewise be greater than that needed at the western entrance. With such an enormous difference in the extent of the works and because of the other decided advantages in favour of the western entrance, I have deemed it unnecessary to prepare detail plans for the improvement of the eastern gap. They would only be useful in determining accurately the difference in the cost of each entrance. Whereas, if the eastern one cost more, I should be unwilling to give it the preference.

If the channel were located at the gap it would need to be about 700 feet longer than the western channel, and the currents through it would therefore be less rapid than through the western one under the same conditions of wind and tide. Hence they would not maintain a channel of as great a width and depth as the western one. I should not, however, expect to find much difference in them from the injurious effect of wave action at their lake entrances, because either one selected for improvement must first be dredged to the maximum depth required, and as this would be the depth at which there would be little or no disturbance of the bottom at the end of the channel by wave action, there need be but little fear that either channel would require dredging as a result of wave action alone. The lake currents, however, carry more or less sand in suspension, and if this be carried into a channel of great dimensions than the tidal action or pulsations of the harbour demand, they will be deposited in it and will gradually diminish its size to that which can be permanently maintained by the maximum currents through the channel.

To attempt to utilize the present western channel would involve the removal of a large amount of stone by blasting to obtain a sufficient depth, and would moreover require the channel to be crooked, inasmuch as the western end of it would necessarily have to be curved to the south west to reach the deep water of the lake. Thus located it would require to be very considerably longer than a straight cut across the peninsula. This greater length, and its curvature, would be very objectionable. The greater length would increase the friction of the currents flowing through the channel and therefore diminish their velocity. The curvature would diminish their velocity still more, by checking the momentum of the water.

I am confident that a channel 300 feet wide between parallel works, at the western end of the harbour, with a central depth of 18 feet below the present zero or datum plane, can, when once established by dredging, be afterwards maintained by the natural currents through it, if it be located across the northern end of the peninsula between the lines, shown on the accompanying chart, (No. 1), provided all other communication between the lake and the harbour be completely closed.

I have the honour to submit the following

RECOMMENDATIONS.

1. The closure of the Eastern Gap with a dyke of sheet piling, protected on the sea side against undermining, with brush and stone.
2. The construction of a breakwater and the necessary parallel works to protect and maintain a channel 300 feet wide and 18 feet deep across the northern end of the peninsula, to connect the deep water of the harbour with the deep water of the lake.
3. The excavation of the necessary depth and width of channel through the parallel works, after they shall have been constructed.
4. The closure of the present western channel, after the new one shall have been sufficiently developed to afford equal facilities for commerce, by the construction of a dyke from the western end of the Queen's wharf to the northern jetty of the new channel.
5. The closure of all communication between the harbour and Ashbridge's Bay, with a dyke of light sheet piling or one of earth, three feet above the present datum plane, or zero of the gauge.

All of these works, except those necessary to completely separate the harbour from Ashbridge's Bay, should be located and constructed in accordance with the plans and specifications herewith submitted. The closure of the Eastern Gap, and the construction of the breakwater and channel works, should be executed at the same time to secure the earliest benefit of the proposed improvement. If this be not done, I would then recommend the construction of the channel works and breakwater first, and the closure of the gap while the new channel is being dredged out. I do not think the diversion of the Don into Ashbridge's Bay necessary, except as a sanitary measure. So far as this would affect the channel and harbour, it is probable that the injury which may be done by the small quantity of sediment that the Don brings into the harbour, will be compensated for by the increased current it will give through the channel when in flood. Should it be found a few years after the proposed works are completed that its deposits are injuriously affecting the depth of the harbour, it can then be diverted into Ashbridge's Bay, if it shall not have been previously done for sanitary reasons. It is quite probable that the closure of the Eastern gap and the growth of the city will soon make such diversion of the Don imperative as a means of promoting the public health.

Plans are not submitted for the dyking to separate Ashbridge's Bay from the harbour, because this work will be of a simple character, and comparatively inexpensive. I would recommend that its construction be open to competition, with the understanding that each bidder submit with his proposal the plan by which he intends to execute it, leaving to the Chief Engineer the selection of the best and cheapest proposal. This work will be exposed to very little servitude if it be sufficiently distant from the shore line of the harbour to be safe from floating ice. The greater

portion of the marsh near the harbour shore is probably already 3 feet above zero, thus leaving only the sloughs to be closed. In any event the cost of the necessary work here will not probably exceed five thousand dollars.

If the closure of the Eastern gap be executed in accordance with the specifications and plans herewith submitted, I am of opinion that a sand beach will be formed in front of the dyke before the parts of it exposed to decay will be destroyed, and that no expenditure for the maintenance of the dyke will be required. The total estimated cost of the works recommended is \$250,693.85.

I have the honour to be, Sir, with great respect,
Your obedient servant,

JAS. B. EADS.

St. Louis, Mo., March 14th, 1882.

Hon. Sir H. L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Canada.

NOTE.—Estimates and specifications, with nine sheets of drawings, are herewith submitted.

MEMORANDUM.

TORONTO HARBOUR, ONTARIO.

Toronto, formerly York, is situated on the northern shore of Lake Ontario, in lat. $43^{\circ} 38' 10''$ N., and long. $79^{\circ} 23' 45''$ W., 333 miles by rail south-west from Montreal, 161 miles from Kingston, and 39 miles north by east from Hamilton.

The harbour is formed inside of the Island, and has its principal entrance from the westward. An entrance known as the "Eastern Gap" has existed for some years, but, owing to its shallowness, is not used by steamers or sailing craft of large dimensions. At the north-eastern corner the Don empties; and the eastern side is bounded by marshy lands of many acres in extent, which separate it from Ashbridge's Bay.

In 1788 this harbour was minutely described by J. Collins, Deputy Surveyor General, in a report presented to Lord Dorchester, Governor General, on the military posts and harbours on Lakes Ontario, Erie and Huron. Mr. Collins stated it to be "near two miles in length from the entrance on the west to the isthmus between it and a large morass on the eastward. The breadth of the entrance is about half a mile, but the navigable channel for vessels is only about 500 yards, having from three to three and a half fathoms water. The north or main shore, the whole length of the harbour, is a clay bank from twelve to twenty feet high, and gradually rising behind, apparently good land and fit for settlement. The water is rather shoal near the shore, having but one fathom depth at one hundred yards distance, two fathoms at two hundred yards; and when I sounded here the waters of the lake were very high." ("Toronto of Old," by Dr. Scadding, p. 16.)

The first survey of the harbour was made by Bouchette in 1793, and a copy of his plan is attached hereto.

In his work on the "British Dominions in North America," published in 1832, Mr. Bouchette describes the harbour of Toronto as follows:—(Vol 1, p. 88.)

"The harbour of York is nearly circular, and formed by a very narrow peninsula stretching from the western extremity of the Township of Scarborough in an oblique direction for about six miles, and terminating in a curved point nearly opposite the garrison, thus enclosing a beautiful basin about a mile and a half in diameter, capable of containing a great number of vessels, and at the entrance of which ships may remain with safety during the winter. The formation of the peninsula itself is extraordinary, being a narrow slip of land, in several places not more than sixty yards in breadth, but widening towards its extremity to nearly a mile; it is principally a bank of sand, lightly overgrown with grass; the widest part is very curiously intersected by many large ponds that are the continual resort of large

quantities of wild fowl; a few trees scattered upon it greatly increase the singularity of its appearance; it lies so low that the wide expanse of Lake Ontario is seen over it; the termination of the peninsula is called Gibraltar Point, where a block-house has been erected. A light-house at the western extremity of the beach has rendered the access to the harbour safely practicable by night. The eastern part of the harbour is bounded by an extensive marsh through which the River Don runs before it discharges itself into the basin."

"No place in either province has made so rapid a progress as York. In the year 1793 the spot on which it stands presented only one solitary Indian wigwam; in the ensuing spring it was selected by Governor Simcoe as the seat of Government for Upper Canada."

With the growth of the population and the clearing and cultivation of the surrounding lands, and notably the disappearance of the Scarborough Heights to the eastward, from whence was derived the materials forming the peninsula, changes were soon apparent in the state of the harbour, and the necessity for its preservation early engaged the attention of those who were interested in its maintenance and improvement. They viewed with alarm the changes which had taken place in the dimensions of the peninsula, and the encroachment of the shoal from Gibraltar Point northward, to the great detriment of the entrance, and so early as 1833, as appears by the journals, Upper Canada Legislature, 1833-34, a select Committee reported on certain reports submitted by Captain Richardson and Captain (afterwards Sir) R. H. Bonnycastle, Royal Engineers, on its preservation. (App. p. 1, *et seq.*)

The Commissioners in their report recommended the construction of a work extending from the island along the top of the shoal to the buoy, in a manner to continue the island to the brink of the channel opposite the present pier (Queen's Wharf), contracting the channel to about 700 feet in width; and also to prevent the waters of the Don from entering the harbour. (App. p. 2.)

Captain Richardson's letter is but an amplification of the views of the Commissioners, of whom he was one.

The opinions entertained by Captain (afterwards Sir Richard) Bonnycastle to make the harbour a secure and effectual one for large steamers and deep draught vessels were divided by him into three general propositions:—

- 1st. That of damming up the western estuaries of the Don;
- 2nd. The opening a passage through the eastern end of the peninsula; and
- 3rd. The construction of a breakwater from the shore at the western entrance with works over the whole length of the shoal from Gibraltar Point, to confine the western entrance.

Sir Richard proceeded to debate the first proposition and arrived at the conclusion that it did not signify whether the breaches which the Don had made into the harbour be closed or not, and believed that the river is useful in a very slight degree.

With respect to the second proposition he plainly stated that if an opening be made through the beach the harbour would be entirely destroyed, and if it be done extensive works must be run out into the lake, etc., to arrest and retain the shingle which is (was) brought by the wasting away of the Scarborough Heights from the eastward, and so to prevent a silting up of the channel so formed; but he feared that a navigable channel could not be kept clear, and that vessels would experience much difficulty during gales from the east around by the south to the west, in entering such a channel; and he summed up with the statement that there could not be any harm in making a small canal shut in by flood gates and protected by piers, and that under these restrictions no obstacle would be thrown in the way, and that it would be very useful for the purposes of trade.

The third proposition is discussed at length, and the conclusion arrived at was that the western entrance should be protected and maintained.

It appears that no action was in any way taken on this report, and, though the matter engaged attention, little or no regard was paid to the state of the harbour, though a Mr. Roy, C.E., drew attention to its state in an article published in the

Monthly Review in June, 1841. Search and enquiry have failed to obtain a copy of this paper.

Under date 4th May, 1847, Mr. C. S. Gzowski, then an engineer in the service of the Department of Public Works, reported that the entrance had narrowed to 250 feet in width, the bar having increased 280 feet in a northerly direction in seven years. (App. p. 17.)

In 1850, Mr. Sandford Fleming, C.E., read a carefully prepared paper before the Canadian Institute, in which he entered fully and minutely into the theory of the formation of the peninsula, described the changes which it was constantly undergoing, and its great increase in area since Bouchette's survey in 1793, and he debated the propositions which had been made and concluded:

1. That the foundation of the peninsula in its early stages may be attributed to the *debris* of the country traversed by the Don, in conjunction with a drift from an ancient promontory at Scarborough.

2. That the more recent portions were formed by materials from the Scarborough Heights.

3. That the formation is due to the travelling of the sand and gravel, under certain action of the waves.

4. That the harbour was being impaired and its only entrance threatened with early destruction by the same cause.

5. That its preservation may be permanently affected by the construction of certain specified works, at well selected points.

6. That the waters of the Don should be permanently excluded.

7. That the opening of an eastern passage would be a great accommodation to shipping; might improve the purity of the water in the harbour; and, if the necessary works to preserve it were properly executed, would have a beneficial effect.

Early in 1852, Mr. Walter Shanly, C.E., at the request of the Harbour Master submitted for the information of the Harbour Commissioners a report on the state of the channel and the improvements required. (App. p. 18.) In it he stated that from the observations and soundings recorded during twenty years by the Harbour Master it was ascertained that the bar had advanced northwardly across the entrance at the rate of 19 feet yearly, and that the available width of the channel was scarcely 200 feet.

Mr. Shanly's theory of the formation of the peninsula is that the material forming it were brought from the westward, and that the Don assisted as well, and he states that were the operations of Nature left unmolested, future generations might walk dry shod across to the outer light-house.

The remedy he proposed was dredging and the construction of crib-work on the southern side of the channel to define and maintain its width; and to divert the Don into Ashbridge's Bay.

Mr. Kivas Tully, C.E., in a letter dated 10th February, 1853, discussed fully the need of permanently improving the harbour, alluded to the opening of a passage through the peninsula, now known as the Eastern Gap, and suggested its improvement from an economical point of view—

1. On account of the saving of time to vessels arriving from or departing to the eastward, and

2. The tendency of the current created to maintain an open harbour later in the fall and earlier in the spring.

In the appendix, page 22, will be found an able review from the journal of the Canadian Institute, vol. 1, p. 162, of the letters and reports by Messrs. Bonnycastle, Shanly, Fleming and Tully.

In 1850 the harbour was placed in commission, Captain Richardson being Harbour Master. This gentleman, in January, 1854, submitted to the Commissioner a report on the state and requirements of the harbour, and alluded to the many changes which had taken place over a period of 50 years, and to the necessity which then existed for steps being taken to ensure the preservation of the western entrance in a navigable state, and to a depth of 14 feet and a width of 400 to 500 feet. H

alluded to a breach through the peninsula to the eastward, near Privat's Hotel, which was then only 140 feet in width. Reference is made to an old chart of about 1800, on which the western entrance was shown to be about 1,455 feet in width from 12 feet inshore to 12 feet on the bar, and that the soundings in the channel were 3 and $3\frac{1}{2}$ fathoms. (App. p. 27.)

This report bore fruit, for the Harbour Commissioners, in March, 1854, offered premiums for the three best reports on the means to be adopted for the preservation and improvement of the harbour, the points to be discussed being:—

1. The effects, present or future, to be produced by the breach (Eastern Gap) through the peninsula on the harbour.

2. If prejudicial, the means to be taken to strengthen the coast against further encroachment.

3. If beneficial, the proper mode of making it useful, and the cost of doing so.

4. The advisability of opening a passage between the harbour and Ashbridge's Bay, or an opening from the lake into the lake, with an estimate of cost.

These premiums were obtained by Messrs. Hind, Fleming and Tully, and an extra premium was awarded to Captain Richardson for a report submitted by him.

The reports were published at the expense of the Harbour Commissioners, and will be found in the Appendix, p. 30 *et seq.* They furnish a vast amount of information respecting the harbour, and discuss fully the questions submitted by the Commissioners. No attempt is made by the writer to condense the views and opinions expressed in these different reports, because to do so would necessitate the use of extended quotations, which is not within the province of this memorandum.

No action was taken on any of the suggestions made by the writers of these reports as regards the construction of works; but it is gathered from subsequent reports by the Harbour Master—Captain Richardson—that dredging plant was obtained and used to keep the western entrance from closing up.

In 1856 it appears that the available width of the western entrance for deep draught vessels was only 260 or 270 feet, although dredging had been carried on for some time. At that date 400 feet was considered to be the least width, and 12 feet the least depth, which should be obtained. (App. p. 94.)

In his report for 1857, the Harbour Master states that many changes had been observed in the shape of the island; and that the point bounding Blockhouse Bay on the western side had greatly increased northwardly. He alluded to damage done to the peninsula, that the embankment for its preservation was never finished, and did not advise its repair. (App. p. 95.)

From the report of 1858, it is gathered that a breach had been effected through the peninsula, and that the influx of water into the harbour from the eastward was deemed to be of great benefit. (App. p. 96.)

At the end of 1859 the neck of land at the peninsula had disappeared, and a navigable channel with from 7 to 8 feet of water had taken its place, and new formations of sand on either side appeared. (App. p. 98.)

In the report of 1860 it is stated that the western entrance having been dredged to 400 feet in width, and an average depth of 12 feet, both had been maintained; and that the island shoal had extended westwardly and threatened to encroach on the channel. The depth in the eastern channel was 6 feet. (App. p. 99.)

Capt. Richardson, in his report for 1861, refers to the opening at the eastern end of the harbour as having been the means of purifying the water in the harbour, and of contributing to the health of the city.

The island shoal had extended further to the westward, and beyond the influence of the current deflected and guided by the Queen's wharf, and the channel had been maintained at its width of 400 feet. (App. p. 100.)

Mr. S. Keefer, then Deputy Commissioner of Public Works, in reporting on a petition of the Council of the Corporation of the City of Toronto, that a survey of the harbour be made "with a view to ascertaining the cause of the dilapidations which have already taken place, and of devising some means of arresting their progress," refers to the reports of the gentlemen who had in previous years examined the har-

hour, and stated the results of his own examination, and advised that a careful survey should be made under the direction of an able hydraulic engineer, as "the subject requires to be treated both theoretically and practically, with a view to the satisfactory delineation of the causes which have operated in the formation, but are now apparently directed to the destruction of the harbour; as well as devising some plan for directing them beneficially in future for its preservation and protection. The problem not being easy of solution should therefore be committed to the ablest hands."* (App. p. 101.)

No action was taken on this recommendation.

The Harbour Master, in his report for the year 1862, stated that a bar of sand had grown up inside of the eastern entrance over which the water was shoaler than in the entrance itself. The "gap" or entrance had increased to half a mile in width, and the line of beach had so far receded that a boiler of a wrecked steamer which formerly was high and dry, was then 100 yards out in the lake and in deep water.

At the western entrance the island shoal had extended to 300 feet west of the then west end of the Queen's wharf, and had advanced northwardly 40 feet. (App. p. 103.)

During 1863, following the suggestions of the Harbour Master, the Queen's wharf was extended westwardly 200 feet, and, up to the end of 1864, a channel 400 feet in width, with a depth of 13 feet, had been secured.

The bar inside of the Eastern Gap had been thrown farther into the harbour and had only 6 feet of water on it, thus limiting the passage to vessels of light draught. (App. p. 105.)

In his report for 1865, Captain Richardson stated that the Highlands of Scarborough, the source from which the materials composing the peninsula and island were derived, no longer existed, and therefore a wasting away of the latter was going on.

The western entrance maintained its width of 400 feet, and a depth varying from $11\frac{1}{2}$ to $14\frac{1}{2}$ feet, according to the height of the water in the lake. The island shoal still progressed westwardly, and during 34 years had increased in width 700 feet, or at the rate of 22 feet annually. (App. p. 107.)

Mr. Kivas Tully, Engineer to the Harbour Board, reported that during 1866 the western entrance remained at 400 feet in width, which was due to the extension of the Queen's wharf westwardly (App. 108); and, in his report for 1867, again referred to the westerly increase of the island shoal, and stated that "the formation west of Lighthouse Point had increased during the last few years, and an additional tongue or arm" (now Hanlan's Point, see plan showing changes in the harbour during 1874, 1875 and 1879) "had formed, which trends in a northerly direction, about 300 yards west of the island, making another bay; this formation no doubt will continue to increase." (App. p. 109.)

This tongue, or arm, now known as Hanlan's Point, has increased up to 1880 until it now extends northwardly beyond Gibraltar Point, and the shoal from it has been pushed forward yearly until in 1875 it had narrowed the western entrance to a width of 230 feet—see plan herewith.

In 1876 a report, (App. p. 100 *et seq.*), was submitted to the Secretary of the Department of Public Works, by Mr. Wm. Kingsford, engineer in charge, who entered fully into the state and requirements of the harbour, and advised that the Parliamentary grant of \$20,000 should be expended in dredging, as "the present approach to Toronto by deep water necessitates an abrupt turn to enter the "Queen's Wharf Channel." In the improvement contemplated, easy entrance and egress should be secured;" and that "the increased navigation of the canal system of the Dominion points out that the entrance should ultimately be 16 feet deep."

Between 1st July, 1874, and 30th June, 1880, the sum of \$49,120.90 had been expended, principally in increasing the width and depth of the "Queen's Wharf Channel." Shortly after dredging was commenced it was found that, to obtain a depth

* The date of this report should be 1862, instead of 1872 as printed.

of 16 feet at low water, it would be necessary to blast in solid ledge, and to a certain extent this was done. No attempt was made to straighten the abrupt turn, or to render the channel any easier for entrance or exit, the object being the opening of a channel 300 feet in width with 16 feet of water on the old course.

On the plan of the western entrance herewith will be seen the encroachment of the point of the shoal northwardly, and the width of the navigable channel in 1863, 1875, 1879 and 1880.

A plan of the harbour is attached, showing its state in 1841 (?), and it may be compared with that showing the changes observed in the eastern and western entrances in the years 1874, 1875 and 1879.

At the Session of Parliament of 1880, the sum of \$12,500 was appropriated for expenditure in this harbour, part of that amount to be expended in dredging the western entrance, which in the spring of 1880 had been narrowed to 280 feet by the growth of the island shoal northward.

As the present entrance has been pronounced to be abrupt, and it is known that to obtain a depth of 16 feet at low water would necessitate the removal of a large quantity of solid rock at a very great expense, it was judged that—as in former years the entrance was some 500 yards in width with deep water—a comparatively straight cut might be made through the point of the shoal, and a depth of 16 feet obtained without touching the rock. A line of easy entrance from 18 feet outside to the same depth inside was laid out, and a series of borings made showed that a depth of 17 feet below zero of the gauge on the Queen's wharf could be had without the removal of any rock. This line is about 700 feet to the southward of the Queen's wharf, and dredging operations have been commenced in the removal of the point of the shoal northward of this line. The material to be removed is fine sand.

It has been deemed desirable to include in the Appendix a letter by Mr. J. G. Worts, the Chairman of the Harbour Board, (p. 115), and also the petitions to His Excellency the Governor General from the Mayor and Corporation of the City of Toronto, and the Harbour Commissioners, praying that steps be taken by the Federal Government to protect the harbour and preserve it for the future (p. 117, *et seq*).

As, throughout the whole of the reports published in the Appendix, constant reference is made to the height of water in Lake Ontario, and the effects its variation periodically has had upon the changes which have taken place in the peninsula, now island, bounding the harbour on the south, and in the harbour itself, there has been attached an article from the "Canadian Journal," vol. 2, entitled "Variations in the Level of the Lakes," which may not be out of place in connection with the object of this memorandum. Through the courtesy of Mr. Kivas Tully, C.E., who as Harbour Engineer has an intimate acquaintance with the harbour and the many changes which have taken place during very many years, permission has been given to attach a copy of his paper on "The Fluctuations of Lake Ontario from the year 1854 to 1878," and of the chart prepared to accompany it. (App. p. 132).

The writer believes that he has touched upon the salient points of the reports and documents which have been gathered and printed herewith. That it has been shown that in early days, nearly 100 years ago, the width of the western entrance was nearly 500 yards; that on each successive examination this width was found to be gradually lessening; that through natural causes an opening was made through the peninsula at the eastern end of the harbour, and that a wide and comparatively shallow entrance now exists; and that for nearly half a century it has been the desire of those interested in the welfare of the harbour that steps should be taken to ensure its preservation for the future; that though many reports have been made and suggestions and estimates of cost submitted, none have been adopted nor acted upon, even in part; and the same forces of Nature which have acted through past years are still acting unchecked to the detriment and possible destruction of the finest harbour on Lake Ontario.

It may not be amiss here to state that the waters of the Don and the sewage from the city still empty into the harbour.

The questions have therefore arisen what course is to be pursued, what is to be done to preserve this harbour; and further is it necessary or desirable so to improve the eastern entrance as to maintain always a navigable depth of 16 feet, and to construct such works as may be required to restrain the encroachment of the Island shoal, and preserve the western entrance at such a width and depth as will give easy access and exit? On the proper solution of these questions depends the preservation of Toronto Harbour.

The writer has to acknowledge the assistance he has received from Mr. M. Baldwin, the Harbour Master, and Mr. Helliwell, the Deputy Harbour Master, in obtaining many of the reports published herewith; and his thanks are due to Mr. K. Tully, C. E., for his reports and paper on the lake levels.

Respectfully submitted,

HENRY F. PERLEY,

Chief Engineer.

CHIEF ENGINEER'S OFFICE,
DEPARTMENT OF PUBLIC WORKS,
April 11th, 1881.

NOTE.—The Appendix referred to in this Memorandum is not published.

APPENDIX No. 15

REPORT

ON THE

OVERFLOW OF LAKE MANITOBA,

WITH SUGGESTIONS RESPECTING THE LOWERING OF THE LAKE
LEVEL AND DRAINAGE OF THE ADJACENT COUNTRY, BY
H. F. PERLEY, CHIEF ENGINEER, DEPARTMENT OF
PUBLIC WORKS, AND THOS. GUERIN, C.E.

APPENDIX No. 15.

REPORT ON LAKE MANITOBA OVERFLOW.

Ref. No. 10,247.

CHIEF ENGINEER'S OFFICE,
OTTAWA, 22nd December, 1880.

SIR,—There is not any information in the Department relative to Lake Manitoba.

I note in the letter from the Deputy Minister of the Interior (No. 9,961) that during the past few years the waters of this lake have been gradually rising, and are now 4 or 5 ft. higher than ever before known. I learn also that a survey was made in order to ascertain the nature and extent of the obstacles in the Fairford River, the outlet into Lake Winnipeg, copies of the plan and section there obtained accompanying the letter.

Enclosed in this letter is a note that I shall furnish an estimate of the probable cost of the dredging required for the improvement of this river.

Lake Manitoba is about 120 miles in length and of an average width of 18 miles and I have learned from the Deputy Minister of the Interior that in no part of it can a greater depth than 25 feet be found. It is an extremely shallow lake having sandy shores, and advantage has to be taken of the rivers and streams emptying into it to effect a landing.

The Fairford—or, as it is termed on the plan and section, “Partridge Crop” River—has an average width for some distance from its mouth of 400 feet, with banks from 7 to 10 feet in height above the present level of the water. According to the soundings given on the plan, it appears that a shoal exists in Lake Manitoba across its mouth, having 5 feet depth in its shoalest part; and in a distance of a mile from the mouth two shoals are found and a third at $1\frac{1}{2}$ miles still further on.

As marked on the section these shoals are composed of gravel and boulders. I note that the fall in the surface of the river is at the rate of $2\frac{1}{2}$ feet per mile, and this is sufficient to cause the very rapid current which exists, a current strong enough to scour out any obstruction if composed of a comparatively soft or friable nature. As the obstructions which exist are said to be composed of gravel and boulders, I am inclined to believe that these materials must be compacted together, and will prove to be hard dredging.

It appears that at the time (10th Nov. 1880) the survey was made, Lake Manitoba was 4 or 5 ft. above its normal level, and the water in its outlet correspondingly high. As these soundings show depths of $4\frac{1}{2}$ and 6 ft. on the obstructions complained of, it follows that when the lake is at its normal level, the water in the Fairford river can only be a foot or more in depth.

The average width of so much of the Fairford as is shown on the plan is 400 feet, and if the deepening proposed is to be of any benefit, a channel of that width must be cut through the obstructions to give vent to the greatest volume of water such a narrow channel will convey. It must be borne in mind that the problem to solve is the lowering of an area of at least 1900 square miles a depth of 4 feet, and maintaining that reduced level for the future; to do this the widest and deepest channel possible to obtain, must be provided.

The following is a statement of the quantity of dredging to be done in the removal of the shoals colored *red* in the section herewith, based on a width of 400 feet :

Channel in Lake Manitoba.....	93,000
“ “ River 4 to 32.....	117,600
“ “ “ 34 to 52.....	18,000
“ “ “ 115 to 124.....	18,900

Total..... 247,500 cub. yds.

To determine the cost of dredging the quantity thus given, I have assumed that the Department will place a dredge with scows and attendant tug on Lake Manitoba, and will continue working for four (4) years, being at the rate of 62,500 cubic yards, measured in the solid, per 5 or 6 working months, per year.

I place expenses as follows :

Machinery for spoon dredge.....	\$8,000 00
Delivery at Lake Manitoba.....	3,000 00
Hull and fitting up.....	6,000 00
Ropes, chains, tools, spare gear.....	4,000 00
Three (3) 50 yard scows.....	3,000 00
Steam tug complete....	10,000 00

Dredging plant.....	34,000 00
Working expenses, dredge and tug 4 years @ \$8,000.....	32,000 00
Contingencies, repairs and renewals, &c.....	6,000 00
Superintendence. 4 years @ \$2,000.....	8,000 00

Total.....\$80,000 00

and $\frac{\$80,000}{250,000} = 32$ cents per cubic yard, which must be considered a reasonable price, but not one which a contractor would accept for the work in question, as not any allowance has been made for profit.

I have the honor to be, Sir,

Your obedient servant,

(Signed) HENRY F. PERLEY.

Chief Engineer.

F. H. ENNIS, Esq., Secretary,
Dept. of Public Works.

CHIEF ENGINEER'S OFFICE,

Ref. No. 21253.

OTTAWA, 15th February, 1882.

SIR,—Under date 22nd December, 1880, I submitted a report, No. 10247, on the probable cost of dredging the outlet of Lake Manitoba with a view of deepening it to such an extent that it would carry off the abnormal quantity of water in the lake and maintain the normal level in the future.

As the Department did not possess any information relative to this lake, or of the country surrounding it, and as the information relative to its outlet, the Fairford River, contained in No. 9961, was both incomplete and very unsatisfactory, an appropriation was made at the last Session of Parliament to defray the cost of an examination, not only of the lake and its outlet, but to ascertain, if possible, the cause or causes why the lake has risen and remains above its normal level, and to determine the means to be taken to carry off the surplus water and prevent its rising in the future ; and the probable extent and cost of the works required.

In accordance with the instructions contained in your letter, No. 7478, instructions were given to Mr. Thomas Guerin, C.E., to make the examination, &c., required.

This he has done in a most satisfactory manner, and I herewith transmit for the information of the Hon. the Minister, the report he has submitted,

From this report it is gathered that Mr. Guerin saw for himself the effects of the rising of the lake, in the flooded condition of the village of Totogan, situated at the junction of the White Mud and Rat Rivers, six miles from the southern extremity of the lake, and heard the opinions of those who, in dismay at the rising of the waters, were threatening to abandon their farms.

It will be noted that Mr. Guerin, at the outset, assumed that this overflow was due to one of the following causes:—

1. The silting up of the lake by the materials held in suspension and brought by the rivers emptying into it;
2. The “barring” of the outlet, by the movement towards it of the materials composing the bottom of the lake;
3. The gradual sinking of the lands surrounding the lake;
4. That the outlet is unable to carry off the water brought by the rivers which flow into the lake.

During his journey to the outlet, Mr. Guerin became convinced from the soundings taken that the lake was not being filled up by any sedimentary deposit, (1), nor that the adjacent land was sinking (3), for if either of these phenomena had occurred, instead of deeper soundings which were found, the reverse would have been the case; and I may mention that the mouth of the outlet is solid rock and does not show any signs of an accumulation from the bed of the lake (2).

For the determination of cause 4, the inflow of water from the White Mud, and its branch the Rat River, at the southern end of the lake, and the Water Hen, at the northern extremity, the only rivers emptying into Lake Manitoba, was ascertained to be 20,796 cubic feet per second.

The off-take capacity of the Fairford River was found to be 14,833 cubic feet per second, and, therefore, during the time of high water a quantity of 5,963 cubic feet per second is left to accumulate in the lake to overflow its borders, or be carried off by evaporation.

Here, as Mr. Guerin states, an anomalous state of affairs exists; the outlet of this lake, instead of being, as is the rule, larger than the united capacities of the streams emptying into it, is smaller than that of one of them, and the consequence must be that so long as the “Water Hen” continues to bring down equal quantities of water yearly, so long will the lake continue to rise, and it can only become reduced in depth when the rain and snowfall of any season on the area drained by the “Water Hen” are below their usual quantities.

The Fairford River empties into Lake St. Martin from which flows the Little Saskatchewan, which is described by Mr. Guerin as overflowing its banks, expanding and contracting alternately, sometimes rapid, sometimes still; and that its bottom, so far as it has been examined, consisted of rock or boulders, and hard packed gravel, and after a devious course of thirty miles it terminates in Lake Winnipeg.

Lake St. Martin is surrounded by a low flat country which is overflowed in a similar manner to the shores of Lake Manitoba, and the cause was found in the fact that the off-take capacity of the Little Saskatchewan is 2,347 cubic feet less than the discharge through the Fairford, and that this quantity per second of time, less the amount carried off by evaporation, remains to flow over the land.

Mr. Guerin, assuming that the areas of Lakes Manitoba and St. Martin, as given by Professor Hind, viz: 1,902 and 316 square miles respectively, are the normal conditions of these lakes, has determined that the height to which the water has risen above its proper height in each is six feet; and further, from the data obtained, has calculated that the area of land submerged in Lake Manitoba is 323 square miles, and in Lake St. Martin 765 square miles, or 696,320 acres.

The remedy for this state of affairs is simply to provide additional outlets from Lakes Manitoba and St. Martin, and transfer the surplus water to Lake Winnipeg, which from its great size would not be raised over two inches in the year; or as Mr. Guerin states, the rising of the surface of a lake always increases the discharge

through its outlet, it may be concluded that the level of Lake Winnipeg will not be sensibly affected.

In my report of December, 1880, No. 10247, I suggested the deepening of the Fairford River by dredging, to increase the discharge from the lake, and stated that the material of which the bed of the river was composed must be firm, because it had not scoured out under the action of the strong current flowing over it. This bottom, as before stated, Mr. Guerin found to be rock, and therefore, abandoning the idea of deepening the river, he proposes the opening of a new channel from the lake 10,500 feet in length, joining the Fairford River at that distance from its head, where it is $9\frac{2}{10}$ feet lower than the lake. It will be noted that Mr. Guerin proposes the lowering of Lake Manitoba $4\frac{1}{2}$ feet, and maintaining it at $1\frac{1}{2}$ feet above its normal level for the purpose of facilitating navigation.

The character of the Little Saskatchewan has been already described, and is of such nature as not to admit of being improved. To relieve Lake St. Martin Mr. Guerin suggests the opening of a cut to Lake Winnipeg, a distance of $12\frac{2}{10}$ miles, of such dimensions as will effectually carry off all surplus water and prevent its accumulation in the future.

The cost of these works is placed as follows :

From Lake Manitoba to the Fairford River.....	\$36,000
From Lake St. Martin to Lake Winnipeg.....	245,000
Total.....	<u>\$281,000</u>

By the opening of these channels, not only would the waters of these lakes be reduced in a few years to their normal level, but they would remain so, and the many acres of land now submerged and valueless, would be recovered and become of value and fitted for settlement; and not only that, for so long as the Fairford and the Little Saskatchewan remain unchanged, the probabilities are that the waters of Manitoba and St. Martin will continue to rise, and the area of submerged land to increase in proportion.

Mr. Guerin has calculated that 696,320 acres of land are to-day flooded, and that, estimating their average value at \$2.00 per acre, their total value will amount to \$1,392,640, a handsome return for the expenditure of the amount estimated as above.

I cannot conclude this summary of Mr. Guerin's report without bearing testimony to the able manner in which he has performed the duty assigned to him, and for the solution of the problem set before him; and, although the remedy proposed may appear to involve the expenditure of a large amount of money, yet the result to be obtained will prove to be of immense and lasting benefit.

I have the honor to be,

Sir,

Your obedient servant,

HENRY F. PERLEY,
Chief Engineer

F. H. ENNIS, Esq., Secretary,
Dept. of Public Works.

MR. GUERIN'S REPORT.

OTTAWA, 29th January, 1882.

SIR,—It has been already stated in the remarks concerning the River Assiniboine, that in consequence of the flood on that river, last summer, attention was directed without delay to Lake Manitoba.

The party was accordingly transferred to Totogan, a village situated at the junction of White Mud and Rat rivers, and within about 6 miles of the southern extremity of the lake.

This village was at that time flooded to so great an extent that it was with difficulty camping ground could be found in its vicinity.

The appearance of the country all round this place was uninviting. All parties who were consulted on the subject agreed that the lake had been rising every year for five years. The lake had now spread its waters over the land as far as Totogan Village and flooded the houses there. The farmers in the vicinity appeared dismayed and were threatening to abandon their farms. Seeing a lake of over 1,900 square miles in extent rising more and more every year, and spreading over the land, they naturally asked what reason had they for believing that their farms were not going to be irrevocably lost and themselves ruined if they continued to remain in the district. Such were the sentiments then expressed by the people.

To remedy those evils there must be means devised to confine the lake within its legitimate boundaries and prevent it from exceeding those boundaries in future. This is the problem involved whose solution is here submitted.

Before seeking a solution to this question the cause of the overflow must be first discovered ; and in searching for this there are four possible causes which prominently suggest themselves :—

1. The lake may rise and overflow its banks in consequence of being filled up by the materials held in suspension in the rivers flowing into it.

2. The lake may rise in consequence of its outlet getting barred by the movement towards its entrance of the materials composing the bottom.

3. The land surrounding the lake may be sinking in consequence of some unknown phenomenon thus causing the water to overflow.

4. The water of the lake may be raised in consequence of an unusually great fall of rain or snow occurring at the heads of those rivers which flow into it ; and the outflow at the same time being unable to meet the increased demand on its capacity.

All or any one of those causes could produce the results observable about the lake, and it was therefore necessary to find which of them existed.

In order to ascertain this information it was necessary to examine the rivers flowing into the lake as well as those flowing from it, and likewise to ascertain the quantity of water taken away from it by evaporation. It was also necessary to find whether the water of the lake was rising or falling for it seemed to rise or fall every day several inches in obedience to the direction of the wind.

Lake Manitoba, according to Professor Hind, has an area of 1,902 square miles. It is surrounded by a low flat country and consists of two parts which are united by a strait called "The Narrows": the greater portion of the Lake being south of "The Narrows." The only supply to it, besides the rain and snow which fall on its surface are Water Hen River which flows into it near its northern extremity, and White Mud and Rat Rivers which flow into it at its southern extremity.

The outlets from the lake are Fairford River and Dog Hung Creek. This latter is too insignificant to be further noticed, but the former issues from the lake at a place north of "The Narrows" and for the first three miles of its length is a large and rapid river with a rocky bottom. It then expands and covers the surrounding country for many square miles, giving rise to a dense growth of bullrushes. In this extent of country is included Partridge Crop Lake, a small body of water clear of weeds of any kind although a few years ago it was only a morass. Emerging from this lake, the river contracts into its normal dimensions for a short distance and finally terminates in Lake St. Martin.

Lake St. Martin, like lake Manitoba, has flooded the surrounding country. It had, a few years ago, an area of 316 square miles according to Professor Hind ; but it has lately swollen into much larger dimensions. The only feeder to this lake is Fairford River and its outlet is the Little Saskatchewan. This latter river overflows its banks, expanding and contracting alternately ; sometimes rapid, sometimes still

Its bottom as far as it has been surveyed consists for the most part of rock or boulders and hard packed gravel. After a devious course of some 30 miles it terminates in Lake Winnipeg.

DISCHARGES OF RIVERS CONNECTED WITH LAKE MANITOBA.

While encamped at Totogan, White Mud and Rat Rivers were examined. The discharge of the former was ascertained about three miles above the village. Here there was no visible mark to show that the water of this river had been higher during the previous spring. At the time of examination there were passing in it 1,425 cubic feet per second. It had a width of 185 feet and a maximum depth of 16 feet.

Rat River, which unites with White Mud River at Totogan, was examined about 5 miles above the junction. The water of this river seemed to have fallen much since the spring—at the time of examination it was only 40 feet wide and there were passing in it only 35 cubic feet per second, although its high water mark showed that during the previous spring it was 250 feet wide and was discharging 729 cubic feet per second.

Having placed some gauges at Totogan, camp was removed to the head of Fairford River which constitutes the outlet of the lake. During this journey soundings were taken in the lake, which showed a depth varying from 9 feet near shore to 15 feet, sometimes 20 feet further outward.

These soundings convinced those who were accustomed to navigate the lake that it was then much deeper than it had been during previous years; a fact which was ample proof that the lake was not being filled by any sedimentary deposit nor was the adjacent land sinking; for if either had been the case the tendency would be to diminish the depth of the lake instead of increasing it.

The discharge through Fairford River was measured at a suitable place about $\frac{3}{4}$ of a mile from the lake. It had a width of 359 feet and a maximum depth of $10\frac{1}{2}$ feet. There were 14,833 cubic feet of water passing in it per second. There was no water mark visible which was higher than the surface of the water then passing in the river, and it seemed to be charged to its full capacity; for in the distance between this locality and the lake it was in places overflowing its banks.

Having inaugurated the work of surveying and sounding this river as well as adjacent portion of the lake, some of the party were transferred to the Head of the Lake for the purpose of examining Water Hen River.

At the mouth of this river there is a large tract of country covered with water and much of it is now producing a dense crop of bullrushes and other weeds; the river having three open channels through these weeds.

About 5 miles above its junction with the lake a suitable place was found for examining it. Here the river was 444 feet wide; its maximum depth was 12 feet and the quantity of water passing in it was 13,930 cubic feet per second. From a water mark visible on its banks it was ascertained that the river had fallen $1\frac{6.5}{100}$ feet from its highest state during the previous spring. When it was at that stage, the quantity of water passing in it amounted to 18,642 cubic feet per second.

DISCHARGES FROM AND INTO THE LAKE.

When the examinations of those rivers were made Water Hen contributed 13,930 cubic feet per second, White Mud and Rat Rivers contributed 1,460 cubic feet per second, thus making the entire discharge into the lake amount to 15,390 cubic feet per second; while the only discharge from it was that through Fairford river or 14,833 cubic feet per second, thus leaving 557 cubic feet per second to accumulate in the lake. From these facts it follows that at the time the investigation was made the lake had to depend entirely on evaporation to reduce its level.

In time of highest flood, Water Hen River discharges 18,642 cubic feet per second into the lake, White Mud and Rat Rivers discharge 2,154 cubic feet per second into the lake, thus making a total of 20,796 cubic feet per second; while the discharge

from the lake could only have been 14,833 cubic feet per second, this being the capacity of Fairford river. It follows therefore that during the time of high water a quantity equal to 5,963 cubic feet per second is left to accumulate in the lake and spread over the adjacent land, or be carried off by evaporation.

Those measurements show an anomalous state of things in connection with Lake Manitoba. It has been a generally understood maxim throughout North America (I believe) that the capacity of the river which forms the outlet of a lake is greater than the united capacities of all the rivers contributing to the lake. The River St. Lawrence is an eminent example of this fact.

In the case of Lake Manitoba, however, the capacity of Water Hen alone exceeds that of Fairford River which forms the outlet of the lake by upwards of 25 per cent. The consequence must be, that whenever Water Hen river gets flooded, the water of Lake Manitoba must rise, and as the capacity of Fairford river aided by evaporation is not sufficient to carry off the surplus water during the time that elapses after Water Hen has passed the point of maximum height, until its next rising, the lake will continue to rise more and more every year until a succession of seasons occur when the rain and snow fall at the water shed forming the source shall be comparatively light.

EVAPORATION.

As it appears that evaporation is one of the principal factors in reducing the level of the lake, a contrivance was resorted to at the camp at Fairford for ascertaining the amount of water evaporated each day.

This contrivance consisted of a cylindrical tin vessel about 3 inches deep and as many inches in diameter. It was filled with water and imbedded in another vessel containing a mixture of sand and gravel. The depth of the water was taken by a scale every morning and evening and registered in a book kept for that purpose. A copy of this register will be found at the end of this report where also will be found a copy of the gauge register.

On looking to the first mentioned register, it will be seen that the loss of water each 24 hours gives a mean of 2-10 of an inch, while the loss during the night time alone is only 2-100 of an inch.

In winter time the evaporation of water is inappreciable while the thermometer registers below 32°.

If a piece of ice is measured and weighed and left exposed, it does not diminish to any appreciable extent in bulk or weight while the mercury is below 32°. Scientists assert that evaporation of water goes on in winter, but I have never known or read of any one who has stated what the amount of such evaporation is during freezing weather or during a Canadian winter. The register at Lake Manitoba during the latter part of the summer shows the mean evaporation to be as low as 2-100 of an inch during each night, or while the water was not exposed to the sun's rays; and during some nights it appeared to be nothing. Now as the evaporation during a winter day cannot be greater than that during a summer night it follows that the mean daily loss from evaporation during the cold months cannot exceed 2-100 of an inch in the vicinity of Lake Manitoba. Taking a mean between the three warmer months and nine colder months there will result .065 inches.

COEFFICIENT OF EVAPORATION.

It must be borne in mind that the vessel used in computing the loss from evaporation was only three inches deep, and as it is well known that the loss from evaporation is greater in a shallow vessel than in a deep one, it follows that the mean daily evaporation of Lake Manitoba is not greater than .065 inches or .005416 feet throughout the year. This is the coefficient which shall be used for evaporation in the present report.

LAKE ST. MARTIN AND ITS RIVERS.

Lake St. Martin is surrounded by a low flat country, and it could be seen in every case, during the journey to Little Saskatchewan river, where the shore was approached, that the old shore line was obliterated by the water overflowing the land.

It has been already stated that the only supply to Lake St. Martin is Fairford River, while its outlet is the Little Saskatchewan River. This latter river on leaving the lake is very irregular as may be seen on the accompanying plan; expanding and dividing into branches for the first five miles of its length. At this distance from the lake it contracts for a short space into what appears to be its normal dimensions and here its discharge was ascertained. Its width was 309 feet, its greatest depth was 16 feet and the quantity of water passing in it was 12,486 cubic feet per second.

Seeing that the discharge into the lake through Fairford River is 14,833 cubic feet per second, it follows that a quantity equal to 2,347 cubic feet per second is left in the lake to flow over the land or be carried off by evaporation.

HEIGHT OF THE SURFACES OF LAKES MANITOBA AND ST. MARTIN ABOVE THEIR NORMAL STATE.

It appears from Professor Hind's report that at the time he made his examination, 1853, Lake Manitoba was confined within boundaries which gave it an area of 1902 square miles, and Lake St. Martin had boundaries limiting its area to 316 square miles. Those areas shall be accepted here as the normal condition of these lakes.

In Professor Hind's report the difference of level between Lake Manitoba and Lake St. Martin is stated to be 15 feet approximately. On this subject it is necessary to remark that unless the weather was calm and had been calm for some time previously, it was difficult to obtain the levels of these lakes otherwise than approximately: for their surfaces rise and fall at the shore several inches each day in obedience to the direction of the wind. The difference of level between these lakes was obtained last autumn and the result varied by about one foot from that obtained by Professor Hind.

This near coincidence goes to show, that although both lakes have risen several feet since the first examination was made by Professor Hind over twenty years ago, yet they have risen equally and the surfaces of both lakes are now at equal elevations above their normal conditions. These elevations are investigated in Note A at the end of this report where it is shown that the height to which the water has risen above its normal state in Lake Manitoba or Lake St. Martin is 6 feet.

DEPTH OF WATER OVER SUBMERGED LANDS.

Adjacent to the channels of Fairford and White Mud rivers where the former descends to nearly the level of Lake St. Martin and the latter to the level of Lake Manitoba, the depth of water varies from 2 to about 4 feet in some places—some two hundred feet removed from the channel the depth seldom exceeds 2 feet. Adjacent to the lake where it overflows the land the same depth of 2 feet is found and then of course diminishes to zero. So that one foot may be considered the mean depth of water over the submerged land.

QUANTITY OF LAND FLOODED.

The results obtained from the investigation continued up to this point, can now be applied to the determination of the area of land flooded by the overflow of Lake Manitoba and Lake St. Martin. The investigation determining those areas is given in Note B at the end. It will be there seen that the area of land flooded by Lake

Manitoba is 323 square miles and by Lake St. Martin 765 square miles, or in other words, in consequence of the capacity of Fairford River not being sufficient to accommodate the increased demand on it when White Mud and Water Hen rivers are flooded, Lake Manitoba has overflowed its banks and flooded 323 square miles of territory; and in consequence of the capacity of the Little Saskatchewan river not being able to accommodate the increased demand on it when Fairford river is at high water, Lake St. Martin has overflowed its banks and submerged 765 square miles of territory: thus giving a total of 1088 square miles of land under water.

NATURE OF REMEDY PROPOSED.

The extent of land damaged by the overflow of those lakes being now ascertained and the prime cause being known, the question is reduced to the determination of means by which to redeem those lands as quickly as possible: the work to be as little expensive as possible and to be of such a nature as to debar for ever a recurrence of the present state of things.

On examining the general map of the country it will appear at once that in reducing Lake Manitoba to its original state, there is no other way but to increase the discharge from that Lake into Lake Winnipeg. The discharge from Lake Manitoba to Lake St. Martin must therefore be increased to a certain determinate extent and also that from Lake St. Martin to Lake Winnipeg.

The channels of the rivers Fairford and the Little Saskatchewan as they appear on the plan, forbid the idea of meddling with them to render them suitable for the conveyance of any fixed determinate quantity: although the positions of those rivers point out the most desirable localities where works to increase the discharge should be built.

When the flood of Water Hen river was at $1\frac{6.5}{100}$ feet above its level of the 5th August (that having been the day on which the examination was made) the quantity of land flooded by Lake Manitoba was found to be 323 square miles and as the area

of the lake is 1902 square miles then $\frac{(1902 + 323) 5280}{86,400} \times .005416$ is the amount of water evaporated per second.

If to this be added the amount carried off by Fairford river, 14,833 cubic feet per second, the sum will be the total amount of water carried off per second from the lake.

Now, as Water Hen, White Mud and Rat rivers when high give a united discharge into the lake of 20,796 cubic feet per second there will result

$20796 - \frac{(1902 + 323) \times 5280}{86400} \times .005416 - 14833 = 2075$ the quantity by which the water

accumulates per second and spreads over the land, while Water Hen river remains at its maximum height. It would therefore seem that besides the discharge through Fairford river an additional discharge of 2,075 cubic feet per second should be obtained from Lake Manitoba.

It is not necessary, however, to build works giving so large a discharge, for this state of things exists only during the short interval of high water. At the time the examination was made, this quantity did not exist, the river having fallen $1\frac{6.5}{100}$ feet as has been already shown, and it appears that the time the river occupied in rising to high water mark and falling again to the level it had on the 5th August was about three months.

The extra quantity poured into the lake during this rising and falling of Water Hen River would be $\frac{2}{3}$ the quantity which would be poured into it, if the river during the three months had remained at its high level (See note C at end); hence if a denote the number of seconds in a month, then $2,075 \times 3a \times \frac{2}{3} = 2490a$ represents the entire quantity poured into the lake during the three months in which the flood was rising and falling. This would therefore be the yearly contribution towards raising

the lake above its level of the 5th August, if the contributing rivers should continue to rise to the same heights during succeeding years.

If works are built which will carry off 1,480 cubic feet per second, then the quantity carried off during a year will be $1,480 \times 12a$, and the lake will be diminished by a quantity equivalent to $17,760a - 2,490a = 15,270a$ and its level will be lowered by a depth equal to $8\frac{1}{2}$ inches.

According to this arrangement, and allowing the rain and snow fall to continue as great in the future as they have been in the last five years, and that Lake St. Martin be left in its present condition, the flooded land around Lake Manitoba would be freed from water in less than three years and the lake would be reduced to its normal state in less than five years. But, if Lake St. Martin be also relieved by an increased discharge from it, the land will be redeemed and Lake Manitoba lowered much sooner as will be seen further on.

It may be supposed that the equivalent water of the winter snow, which falls on the lake itself and remains there until spring, forms another source of supply and must be added to the contributions of the rivers supplying the lake, in order to obtain all the accumulation whose removal must be provided for. But the winter snow on the lake does not enter as a factor, for the reason that the snow water has time to flow off through the outlet before the rivers rise to their full heights, and therefore those two sources of supply cannot occur at the same time.

LAKE ST. MARTIN.

The only supply to Lake St. Martin is Fairford River, which furnishes 14,833 cubic feet per second, and its outlet is the Little Saskatchewan, which carries off 12,486 cubic feet, thus leaving 2,347 cubic feet per second to raise the lake and flood the land. As Fairford River was charged to its full capacity when the examination was made, there can be no higher flood in it than that which then existed; it follows that there must exist an equality between the contribution from this river on the one side and the amounts carried off by the Little Saskatchewan and evaporation on the other side. In this case then, there is no extra amount arising from a high water level going to increase the lake as in the case of Water Hen River. To redeem all the flooded land in one year would require a work competent to carry off 1,162 cubic feet per second. This would lower the lake $2\frac{1}{10}$ feet in a year. It would, moreover, reduce the lake to its normal state within three years, if the increased discharge from Lake Manitoba were not in operation.

If, however, the works on Lake Manitoba were finished at the same time, or before those of Lake St. Martin, then the desired effect on the latter lake would be retarded while that on the former lake would not be augmented; but, if the works on Lake St. Martin were completed one year before the completion of those of Lake Manitoba, the effect on both would be augmented. Thus, if Lake St. Martin were reduced $2\frac{1}{10}$ feet, the discharge from Lake Manitoba through the work which otherwise would produce 1,480 cubic feet per second, would be now increased to 1,637 cubic feet per second, by this means reducing its level by eleven inches in one year and bringing it within its original boundaries in proportionally less time.

Here a question arises as to the desirability of lowering these lakes to their former levels. If this be done, it can be seen on reference to the soundings given on the accompanying plan, that at the entrance to Fairford River there will be only about two feet of water and at the narrows of Lake St. Martin there will be only about the same depth.

Such a depth is not sufficient to accommodate craft of any respectable size to pass from Lake Winnipeg to Lake Manitoba. It is therefore proposed to lower these lakes to the amount of $4\frac{1}{2}$ feet, thus leaving $3\frac{1}{2}$ feet as the minimum depth of water for navigation.

PROPOSED CUT FROM LAKE MANITOBA.

With this end in view a cut is here proposed to be made from Lake Manitoba to station 62 on Fairford River (vide plan). This cut is to be 10,500 feet long and 50

feet wide at bottom with slopes of one in two. The sill at entrance is to be 54 inches below the present level of the lake.

As the water of the lake is to be prevented from descending below the proposed level, it becomes necessary to guard against any undue increase to the discharge through this cut from damage to its entrance. With this view the entrance is to be protected with a double row of sheet piling and to be paved with masonry for 150 feet of its length.

It will be capable of discharging 1,480 cubic feet of water per second, and although discharging into Fairford River, it cannot much affect the discharge through that river from Lake Manitoba. It will raise the water $9\frac{1}{2}$ inches at the point of concurrence; but this locality being below the rapids, and $9\frac{5}{16}$ feet below the level of Lake Manitoba, the discharge from the lake will not be influenced to any serious extent.

The cost of this cut is estimated at \$36,000.

PROPOSED CUT FROM LAKE ST. MARTIN.

Another cut is proposed to be made from Lake St. Martin, commencing about $2\frac{1}{4}$ miles south of the head of the Little Saskatchewan River and going direct to Lake Winnipeg, as depicted on the plan of reference.

It will be capable of discharging 1,162 cubic feet per second. It will be 12 miles long and 60 feet wide at bottom; being protected at its entrance similarly to that from Lake Manitoba.

The estimated cost of this work is \$245,000. If to this sum be added the cost of the work at Lake Manitoba, \$36,000, there will result, as the estimated cost of all the improvements, the sum of \$281,000.

In consequence of the lateness of the season when the survey was made, there was not an opportunity to take a section along either of those projected lines; the estimate of the cost is, therefore, approximate; but, the country is a plane along both routes, a fact which gives an opportunity for obtaining a close approximation of that account.

It is impossible for me to state, with certainty, what the character of all the land is, which is flooded. There is very little of it occupied by settlers except at the southern extremity of Lake Manitoba and a small patch occupied by Indians at Fairford village. In each of these cases the land is unexceptionally good. I may state that I have sailed in a skiff over unoccupied meadow land, which was covered with some two feet of water in the vicinity of Lake St. Martin where the hay was standing 2 feet above the surface; the boat making a channel through it.

Estimating all the flooded land to be worth an average price of \$2 per acre, the total value would reach the sum of \$1,392,640.

It has already been shown that while the supply at the water shed, which forms the source of the contributing rivers, shall continue to be as great as it has been for the last five years, Lake Manitoba must continue to rise for some time to come. Under such circumstances the area of the flooded land would continue to increase, and, as there are no means of ascertaining whether the supply of water shall commence to decline or continue to increase, so there are no means of ascertaining where or where the flood shall stop if matters are left in their present condition.

It may be supposed that the conducting of such an amount of water as the proposed cut conveys into Lake Winnipeg will be the cause of raising the level of the water of that lake, and thus creating in its vicinity all the hardships which are now complained of in the vicinity of Lake Manitoba.

If the proposed cut were made to Lake Winnipeg, then, although all the water discharged through it were to remain in that lake, it would not raise its surface two inches in the year; but, when the fact is considered that the raising of the surface of a lake will always increase the discharge through its outlet, then it may be concluded that the level of Lake Winnipeg will not be sensibly affected by the proposed improvements.

Those ditches which are here recommended to be cut from Lake Manitoba and Lake St. Martin will never require to be repaired; for the sole object in each case being to convey away a certain amount of water, it follows that after this required amount shall have passed the sill of entrance, it matters not afterwards how it acts; whether it excavates for itself a deeper channel by its action on the bottom, or a wider channel by wearing away the sides, the result in either case would only tend to aid in accomplishing the object in view.

NOTE A.

LAKE MANITOBA.

On referring to the soundings taken in Lake Manitoba, it will be seen that the line A, No. 4, at the head of Fairford River, may be considered the place from which the river starts. The section along that line will be, as in the annexed Figure No. 1, where A, No. 4, represents the surface of the water and is 874 feet long. The numbers along this line represent the soundings that were taken, and are 46 feet apart.

It can be easily ascertained that the area of this section is $S=7107$ square feet. The wetted perimeter is $C=874.84$ feet. The Hydraulic depth is $H=8.1238$, and the square root of the inclination as the river leaves this line is $\sqrt{P}=.0077096$.

LAKE ST. MARTIN.

Similarly, the first line of soundings taken at the entrance of the Little Saskatchewan River, as given on plan, may be considered as the line of departure of that river from Lake St. Martin, and is represented in the annexed figure No. 2. The length is 1,080 feet and the soundings are as represented by the figures along this line, being $67\frac{1}{2}$ feet apart.

The area of this Section is $S'=8235$ square feet. The wetted perimeter is $C'=1080.54$. The Hydraulic depth is $H'=7.6212$ and the square root of inclination is $\sqrt{P'}=.005781$.

Let x denote the height of water in each of these lakes above its normal state, or the depth below the surface lines of these sections at which the level of the normal state exists. Then, looking at the Fairford section (Figure No. 1), it appears that at the left end the average inclination, for a short distance, of the bed is 8 feet in 92 feet, and at the right end it is 5 feet in 69 feet. Hence the following proportions:—

$$8 : 92 :: x : \frac{92x}{8} \text{ and } 5 : 69 :: x : \frac{69x}{5} \text{ Wherefore } 874 - \frac{92x}{8} - \frac{69x}{5} = \text{length of}$$

$$\text{section at depth } x = 874 - \frac{1012x}{40} \text{ and the area for the depth } x \text{ will be } \left(874 - \frac{506x}{40}\right) x,$$

$$\text{and the area of the section below the depth } x \text{ will be } 7107 - \left(874 - \frac{506x}{40}\right) x.$$

FAIRFORD RIVER.

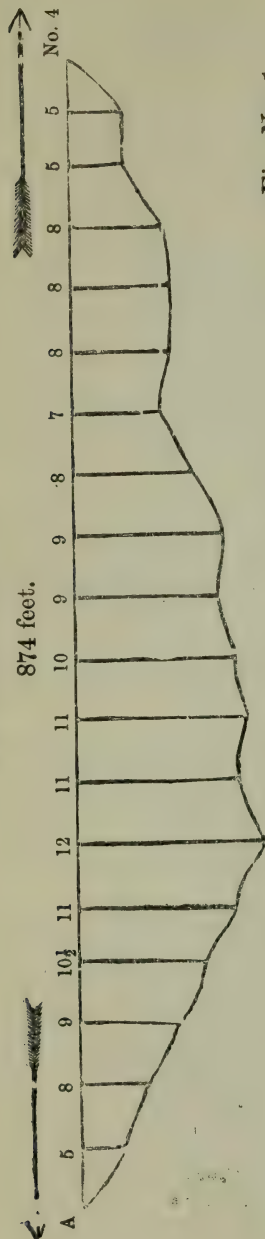


Fig. No. 1.

LITTLE SASKATCHEWAN RIVER.

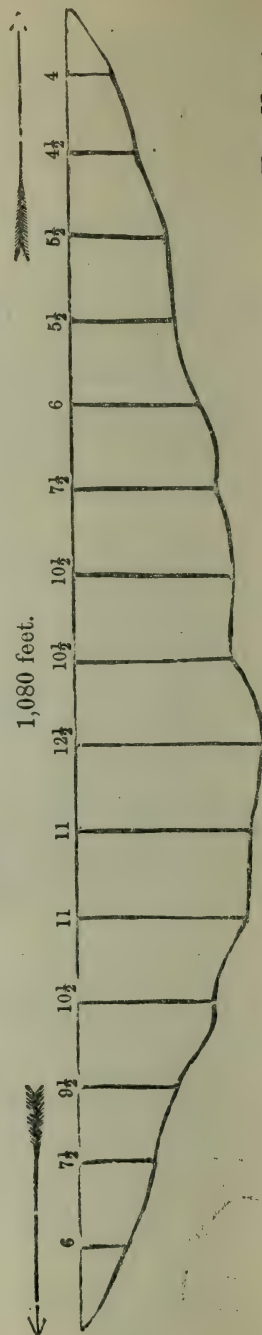


Fig. No. 2.

The wetted perimeter being diminished at the ends by about $\frac{27}{100}$ ft. will be

$$C = 874.30 - \frac{1012x}{40}$$

$$\text{The Hydraulic depth is } H = \frac{7107 - (874 - \frac{506x}{40})x}{874.30 - \frac{1012x}{40}}$$

Hence, if Q represent the discharge through Fairford River, the value of Q when the lake is reduced to its normal condition will be

$$Q = 95 \times .0077096 (7107 - 874 - \frac{506x}{40})x \sqrt{\frac{7107 - (874 - \frac{506x}{40})x}{874.30 - \frac{1012x}{40}}}$$

On referring to the Section (fig. No. 2), the average inclination of the bottom for a short distance at the left end of this Section is $7\frac{1}{2}$ feet in 135 feet, and at the right end it is $4\frac{1}{2}$ feet in 135 feet. Hence the following proportions:—

$$7\frac{1}{2} : 135 :: x : \frac{135x}{7\frac{1}{2}} \text{ and } 4\frac{1}{2} : 135 :: x : \frac{135x}{4\frac{1}{2}}$$

The length of this Section at the depth x will therefore be

$$1080 - \frac{135x}{7\frac{1}{2}} - \frac{135x}{4\frac{1}{2}} = 1080 - 48x$$

and the wetted perimeter is $1080 - 48x$ almost exactly.

The area of the Section for the depth x will be $(1080 - 24x)x$ and the area below the depth x , or when the lake is in its normal state, will be

$$S^1 = 8235 - (1080 - 24x)x. \text{ The Hydraulic depth will be } \frac{8235 - (1080 - 24x)x}{1080 - 48x}$$

Therefore, the discharge through the Little Saskatchewan, when Lake St. Martin is in its normal state, will be

$$Q^1 = 95 \times .005781 [8235 - (1080 - 24x)x] \sqrt{\frac{8235 - (1080 - 24x)x}{1080 - 48x}}$$

When Lakes Manitoba and St. Martin are in their normal state, the discharge through the Little Saskatchewan, together with the evaporation from Lake St. Martin must counterbalance the discharge through Fairford River. The evaporation of Lake St. Martin, whose area is 316 square miles, is 552 feet per second. If this quantity be added to the value of Q^1 there will result $Q = Q^1 + 552$, or the following equation will exist:—

$$[7107 - (874 - \frac{506x}{40})x] \left\{ \frac{7107 - (874 - \frac{506x}{40})x}{874.30 - \frac{1012x}{40}} \right\}^{\frac{1}{2}} \\ + .005781 x [8235 - (1080 - 24x)x] \left\{ \frac{8235 - (1080 - 24x)x}{1080 - 48x} \right\}^{\frac{1}{2}} + 552$$

The value of x found from this equation is 6 feet; whence it follows that when the examination was made last autumn the waters of Lakes Manitoba and St. Martin were 6 feet above the legitimate levels of those lakes.

NOTE B.

THE AREA OF LAND FLOODED.

LAKE MANITOBA.

Water Hen River, when at high water, furnishes. 18,642 cubic feet.

White Mud and Rat Rivers..... 2,154 “

Total amount poured into the lake..... 20,796 “

Fairford River carries off..... 14,833 “

Amount remaining in lake..... 5,963 “

This amount of 5,963 cubic feet per second remains to raise the lake and flow over the land or be carried off by evaporation.

Let z sqr. feet denote the area of land flooded. Then $z \times 1 =$ cubical contents of all the water over this land. $1902 \times 5280 \times 2 \times 6$ is the cubical contents of all the water in the lake over its normal state, and as it occupied 5 years in increasing to

this amount, there will result, $\frac{z + 1902 \times 5280 \times 2 \times 6}{5 \times 365} =$ the increase per day, and

$(z + 1902 \times 5280 \times 2) \times .005416 =$ the amount carried off by evaporation. Hence the following equation: $\frac{z + 1902 \times 5280 \times 2 \times 6}{5 \times 365} + (z + 1902 \times 5280 \times 2) \times .005416 =$

5963×86400 —the number of seconds in a day being 86400.

The resolution of this equation will give $z = 323$ square miles.

LAKE ST. MARTIN.

Fairford River furnishes. 14,833 cubic feet per second.

Little Saskatchewan 12,486 “ “

Amount remaining in lake.... 2,347 “ “

This amount of 2,347 cubic feet per second remains to raise the lake and flood the adjacent land, and is partly carried off by evaporation.

Let z^1 denote the area of land which is flooded by this lake; then, by pursuing the same mode of reasoning as in the case of Lake Manitoba, there will result the following equation:—

$$\frac{z^1 + 316 \times 5280 \times 2 \times 6}{5 \times 365} + (z^1 + 316 \times 5280 \times 2) \times .005416 = 2347 \times 86400$$

The resolution of this Equation gives $z^1 = 765$ Square Miles.

NOTE C.

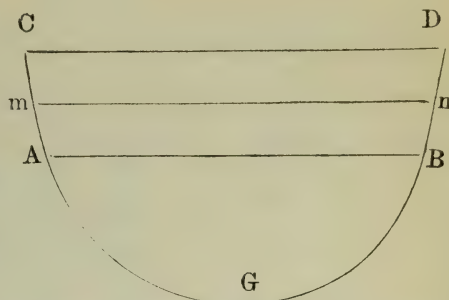
Let C A G B D be a section of Water Hen River ; A B the level of water surface on the 5th August and C D its level when at high water—Let Q=discharge per second at high water.

T = Time the river took to rise during spring to the level of C D.

y = Any intermediate time as when level is at m n.

h = Difference of level between A B & C D = 1⁶⁵/₁₀₀ feet.

h' = Difference of level between A B & m n.



Now as h is supposed to be described uniformly, it follows that the height h' of m n above A B varies as y. It is also evident that the section A B m n varies as the height h' and consequently as y.

Taking into account the flow through the Section A B C D the discharge must vary as the Section $\times \sqrt{\text{Hydraulic depth}}$, and as h and h' may without sensible error be considered the hydraulic depths at the levels C D and m n, it follows that the discharges at C D and m n will vary as T $T^{\frac{1}{2}}$ and y $y^{\frac{1}{2}}$.

Hence if q represent the discharge at level m n.

$$Q : q :: T^{\frac{3}{2}} : y^{\frac{3}{2}} \text{ and } q = \frac{Q y^{\frac{3}{2}}}{T^{\frac{3}{2}}}$$

The entire discharge during the time d y will be $\frac{Q y^{\frac{3}{2}} d y}{T^{\frac{3}{2}}}$ and during the time y

it will be $\int \frac{Q y^{\frac{3}{2}} d y}{T^{\frac{3}{2}}}$. This is $\frac{Q y^{\frac{5}{2}}}{T^{\frac{3}{2}}} \times \frac{2}{5}$ and when y becomes T this becomes $Q T \times \frac{2}{5}$.

By following the same mode of reasoning, if T^1 = the time of falling from high water to the level A B, we would get $T^1 \times \frac{2}{5}$ = the discharge during the time T^1 ; hence $Q \times (T + T^1) \times \frac{2}{5}$ = the entire of discharge, and as $T + T^1 = 3$ mos.; $Q \times 3 \text{ mos.} \times \frac{2}{5}$ is the quantity.

EVAPORATION OF THE WATER of Lake Manitoba in a tin vessel placed in the centre of another tin vessel containing a mixture of sand and gravel.

Day of month.	Time of day.	Depth of water in inches.
	h.m.	
July 29th	6.30 A M	2.15
	6.30 P M	1.90
30th	6.35 A M	1.85
	7.15 P M	1.68
31st	9.05 A M	1.63
	6.40 P M	1.30
August 1st	7.30 A M	1.25
	7.00 P M	1.05
2nd	7.00 A M	1.05
	7.00 P M	0.85
3rd	7.15 A M	0.80
	7.00 P M	0.75
4th	7.00 A M	0.70
	7.00 P M	0.50
5th	6.45 A M	0.45
	7.05 P M	0.25
	7.30 P M	1.95 Replenished.
6th	7.15 A M	1.90
	7.45 P M	1.65
7th	8.45 A M	1.60
	7.20 P M	1.30
8th	7.00 A M	1.25
	6.05 P M	1.15
9th	6.15 A M	1.12
	6.45 P M	0.82
10th	6.30 A M	0.80
	6.30 P M	0.50
11th	8.00 P M	2.80 Replenished.
12th	7.00 A M	2.75
	7.00 P M	2.52
13th	6.30 A M	2.50
	7.00 P M	2.30
14th	8.00 A M	2.28
	6.30 P M	2.15
15th	7.00 A M	2.18
	6.00 P M	2.80 Replenished.
16th	6.30 A M	2.78
	6.30 P M	2.65
17th	6.30 A M	2.62
	7.00 P M	2.45
18th	6.30 A M	2.45
	7.00 P M	2.20
19th	6.30 A M	2.15
	7.00 P M	1.95
20th	6.30 A M	1.92
	7.00 P M	1.75
21st	8.30 A M	1.74
	7.00 P M	1.56

Evaporation of the water.—(Continued.)

Day of month.	Time of day.	Depth of water in inches.
August 22nd	7.00 A M	Removed to Little Saskatchewan.
	7.30 P M	1.54 Replenished.
26th	7.30 A M	1.35
	6.00 P M	2.68
27th	7.00 A M	2.48
	6.30 P M	2.48
28th	7.15 A M	2.35
	6.00 P M	2.34
29th	7.00 A M	2.20
	7.00 P M	2.20
30th	8.00 A M	2.03
	5.45 P M	2.04
31st	7.30 A M	1.95
	6.00 P M	1.95
September 1st	8.30 A M	1.78
	7.00 P M	1.78
2nd	7.30 A M	1.60
	6.45 P M	1.61
3rd	8.00 A M	1.50
	5.30 P M	1.52
4th	9.00 A M	1.35
	5.00 P M	1.52
5th	8.00 A M	1.35
	6.00 P M	1.40
6th	6.30 A M	1.43
	7.00 P M	1.42
7th	7.00 A M	1.42
	7.00 P M	1.25
8th	8.00 A M	1.25
	8.00 P M	1.05
9th	7.30 A M	1.06
	5.30 P M	0.90
10th	8.00 A M	0.92
	4.30 P M	0.92
11th	7.45 A M	2.50 Replenished.
	6.00 P M	2.50
12th	8.00 A M	2.30
	6.30 P M	2.30
		2.15

REGISTER OF GAUGE at entrance of Fairford River—Fig. 5 on gauge having been at the surface of the water when gauge was placed in position.

Day of month.	Height of water.	Weather.
July 28th A M	5.00	S.W. wind.
29th "	4.95	North "
30th "	4.85	North, nearly calm.
31st "	4.90	Calm.
August 1st "	5.15	South wind.
2nd "	5.05	West "
3rd "	4.60	North and cloudy.
4th "	4.60	West wind and clear.
5th "	4.30	North-west wind.
6th "	4.50	South wind.
7th "	5.00	" "
8th "	4.65	North-west wind.
P M	4.60	" "
9th A M	4.63	West wind.
P M	4.50	North wind and clear.
10th A M	4.58	S.W. "
P M	4.70	South "
11th A M	4.70	West "
P M	4.70	" "
12th A M	4.60	North "
P M	4.10	" "
13th A M	4.30	West "
P M	4.40	S.W. "
14th A M	4.55	South "
P M	4.60	" "
15th A M	4.80	" "
P M	4.80	" "
16th A M	4.80	Cloudy.
P M	4.80	"
17th A M	4.60	Clear.
P M	4.50	"
18th A M	4.40	
P M	4.40	
19th A M	4.50	South wind.
P M	4.50	Cloudy.
20th A M	4.40	North wind.
P M	4.30	
21st A M	4.30	South wind.
P M	4.50	
22nd A M	4.70	
P M	4.50	
23rd A M	5.00	South-west wind.
P M	4.80	Cloudy.
24th A M	4.60	Clear and calm.
P M	4.00	
25th A M	4.60	Clear and west wind.
P M	4.50	

Register of gauge.—(Continued.)

Day of month.	Height of water.	Weather.
August 26th A M	4.40	North wind.
P M	4.30	Calm.
27th A M	4.30	North wind.
P M	4.20	" "
28th A M	4.40	Cloudy, with rain.
P M	4.40	Clear.
29th A M	4.40	West wind.
P M	4.30	Very calm.
30th A M	4.20	North wind and clear.
P M	4.10	North wind.
31st A M	4.10	North; cloudy.
P M	4.10	" "
September 1st A M	4.10	" "
P M	4.10	" "
2nd A M	4.10	North wind.
P M	4.30	West wind and clear.
3rd A M	4.40	South wind.
P M	4.40	West "
4th A M	4.50	" "
P M	4.40	North "
5th A M	4.50	West "
P M	4.40	Very clear.
6th A M	4.40	Calm and clear.
P M	4.30	South wind.
7th A M	4.40	N.W. "
P M	4.40	West "
8th A M	4.40	Very calm.
P M	4.50	West wind.
9th A M	4.60	N.W. "
P M	4.60	West and cloudy.
10th A M	4.60	Very clear.
P M	4.50	South wind; cloudy.
11th A M	4.30	West " "
P M	4.30	North "
12th A M	4.30	Very calm.
P M	4.30	South wind.
13th A M	4.40	" "
P M	4.50	" "
14th A M	5.50 ?	North "
P M	4.10	Very calm.
15th A M	4.10	" "
P M	4.10	North wind.
16th A M	4.10	Cloudy.
P M	4.10	"
17th A M	4.10	West wind.
P M	4.20	North "
18th A M	4.20	West " [cloudy.]
P M	4.10	Calm; cloudy.

Register of gauge.—(*Concluded.*)

Day of month.	Height of water.	Weather.
September 19th A M	4.10	North wind.
P M	4.10	" "
20th A M	4.30	" " raining.
P M	4.30	West wind.
21st A M	4.30	S.W. "
P M	4.60	
22nd P M	4.70	

The whole respectfully submitted.

THOS. GUERIN,
Engineer in charge of Surveys.

HENRY F. PERLEY, Esq.,
Chief Engineer of Public Works.

APPENDIX No. 16.

REPORT ON THE DREDGING

OF THE

HARBOUR OF VICTORIA, B.C.,

WITH A STATEMENT OF THE

WORK STILL REQUIRED TO BE DONE,

BY

HON. B. W. PEARSE

AND

HON. J. W. TRUTCH, C.M.G.

APPENDIX No. 16.

REPORT ON DREDGING VICTORIA HARBOUR, B.C.

(Ref. No. 2,732.)

PUBLIC WORKS DEPARTMENT,
VICTORIA, B.C., 12th January, 1880.

SIR,—I have the honour to submit, for the information of the Honourable the Minister of Public Works, and in accordance with the instructions contained in your letter, No. 275, dated 11th November last, a report upon Victoria Harbour Improvements, together with plans and sections of the same, showing the rocks and shoals, the portion of the harbour improved by dredging, the rocks to be removed, those removed, and the portion of the harbour still to be dredged.

The plan marked 1 shows the soundings taken in 1859, and the position of the sections. The sections marked 1, 3, 5, 7, 9, 11, 13, 15, 17 and 18, show the bottom of the channel in 1859, and, for purposes of comparison, the bottom of the channel on the bar at the entrance to the harbour, taken by Captain Devereux, in 1879, and also the bottom when finished to 14 feet at low water. Dredging operations have been continued in a fitful way since 1872. The results are shown in detail in schedule A. Operations have never been, in any one year, continuous, and, as pointed out in my Annual Report 1876, this enhances the cost of the work. A glance at the results will demonstrate this. In 1872-73, the dredger worked for four months, and the cost was 83c. per cubic yard. In 1873-74 she worked three months, cost 70c. per cubic yard. In 1874-75 she worked ten and one half months, cost 28c. per cubic yard. In 1875-76 she worked eight months, cost 32c. per cubic yard. It is to be noted, however, that in 1873-74 the work was confined to the summer months, which will account for cost being less than that of the previous year, although the work was for a shorter period.

In 1859 the water at the entrance to the harbour would only admit of the entrance of vessels drawing 18 feet at extreme high water springs. Now, vessels having that draught can get in at half tide; and vessels drawing 21 to 22 feet can enter at high water springs. In 1859 the entrance at the Spit was only 390 feet wide, it is now 590 feet. It was formerly very tortuous, and, for this reason, long ships found it extremely difficult, even in fair weather, to make the sharp turn necessary at the Spit. It is now a comparatively straight course. The course of a vessel coming into the harbour in 1859 and now, are, for purposes of comparison, both shown on plan 1.

Dredging hitherto has been confined to the area marked A on plan. The number of cubic yards removed from this space and the number to be removed are shown in Schedule B.

The area B, especially along the front of the wharves, appears to have silted up from one to three feet in spots. This is due chiefly to the fact that most of the streets of Victoria are made of sandy gravel, which, with heavy traffic, becomes mud or dust, according to the season. The heavy rains of winter wash down into the harbour the mud from a large extent of country. On New Year's day the harbour waters were the colour of strong coffee.

The western portion of area C is, from its general shallowness, and the many rocks existing there, whose tops are uncovered at low tides, unfit for the

accommodation of merchant ships carrying heavy cargoes. The cost of improving it would be so enormous, that I have not attempted to make any estimate of it. The removal of the "Beaver Rock," now nearly accomplished, has greatly facilitated the passage of vessels to and from their berths. The removal of "Tuzo Rock" will give still more room, especially when the wind is strong from south east. This was the rock upon which that splendid steamer the *Pacific* struck a few years ago, in going to her berth.

The area D will, some day, be a very valuable part of the harbour, from its sheltered position and good anchorage. The portion above James' Bay Bridge is, at low water, at times highly offensive, and there is no doubt that the question of reclaiming it must, sooner or later, engage the attention of the Legislature or Municipal Council.

The proceeds of the sale of the land would go a long way towards paying for the erection of the sea-wall, which would supersede the bridge, and for the dredging. New punts would be required for this work, which could be run up a tramway by means of a small stationary engine, and made to deposit the mud at any desired spot.

The cost of dredging areas B, C and D will be greater than that of A, owing to the greater distance to which the mud would have to be towed unless the scheme for filling up Sandy Bay be adopted.

In this case the cost will be very materially reduced, for the simple reason that, instead of the working days averaging 18 per month, they will amount to 26, there being no detention in towing the punts, due to wind, and but little detention from coaling. I have based my estimate on the removal of 400 yards a day, the ordinary working expenses, including ordinary light repairs, being about \$58 a day.

The rocks known as "Beaver," "Tuzo," and "Dredger" are the only ones which will be required to be removed until the commerce of the port shall have materially increased, and the former may be said to be removed, as in fact there is where it once stood at least 12 feet at low water.

It would appear, then, that in order to get a depth of 14 feet at low water springs over the bar and as far as the wharves, which means nearly 24 feet at high water springs, with a channel clear of rocky obstructions, it will be necessary that the dredging of areas A, B and C should be completed, and that the "Dredger" rock should be removed at the cost shown below:

Dredging area A.....	\$48,831 64
" " B.....	6,823 85
" " C.....	6,387 16
	<hr/>
	\$62,042 65
Removal of "Dredger" rock.....	16,625 00
	<hr/>
	\$78,667 65
	<hr/>

SCHEDULE A—Tabulated results of dredging.

Period of dredging.	Cubic yards re- moved.	Actual cost of dredging.	Vessels, machinery, &c.	Total cost.	Cost, including repairs, per cubic yard.	Cost, excluding repairs, per cubic yard.	Time occupied —Months.	Remarks.
AREA A.—1872-'73.								
7th March, 1872, to 30th June, 1873.....	9,941	8,268 51	4,707 87	12,976 38	1 30	0 83	4	
1873-'74.								
1st July, 1873, to 23rd Sept., 1873.....	13,712	9,617 73	1,464 88	11,082 61	0 81	0 70	3	
1874-'75.								
1st July to 18th August, 1874... 18th Aug., 1874, to 30th June, 1875.....	47,301	13,443 66	Tug... 6,250 00 Mach. 5,087 21 }	24,780 87	0 52	0 28	10½	
1875-'76.								
1st July, 1875, to 29th Feb., 1876.....	37,264	11,944 88	3,057 40	15,002 28	0 40	0 32	8	
1876-'77.								
1877-'78.								
1878-'79.								
1879-'80.								
11th Oct., 1879, to 4th Dec., 1879.....	9,414	2,583 99	11,807 17	14,391 16	1 52	0 27	1½	
	117,632	45,858 77	32,374 53	78,233 30				

{ Wages of caretaker, &c., &c.....\$566 62
do do 541 64
do do 480 00
Repairs to tug 440 35
Tug earned.....,..... 400 00

From 1872 to 1880.—Cost per cubic yard, excluding cost of vessels and machinery..... \$0 39
do including do do and repairs, and 0 66
do excluding the first cost of the dredge only..... 0 66

SCHEDULE B.—Estimated cost of dredging the various areas [and of the removal of rocks.]

	Cubic yards.	Cost per cubic yard.	Excluding repairs.	Including repairs.	Time required.
AREA A.		\$	\$	\$	Working Days.
	93,907	0 28	26,293 96	.....	} 336
Say 279 cubic yards per diem.	93,907	0 52	.....	48,831 64	
AREA B.					
Assuming that mud be deposited outside the Harbor.....	12,407	0 30	3,722 10	.....	} 59
	12,407	0 55	.....	6,823 85	
Say 207 cubic yards per diem.					
Assuming that mud be deposited in St. James' Bay.....	12,407	0 14	1,736 98	.....	} 31
	12,407	0 30	.....	3,722 10	
AREA C.					
Outside Harbor.....	12,283	0 28	3,439 24	.....	} 44
	12,283	0 52	.....	6,387 16	
Inside Harbor.....	12,283	0 14	1,719 62	.....	} 31
	12,283	0 30	.....	3,684 90	
AREA D.					
Outside the Harbor.....	93,147	0 30	27,944 10	.....	} 443
	93,147	0 55	.....	51,230 85	
Inside the Harbor.....	93,147	0 14	10,040 58	.....	} 232
	93,147	0 30	.....	27,944 10	

REMOVAL OF ROCKS.

Beaver Rock.

Estimated content in cubic yards.....	884
do do removed.....	850
do do to be removed.....	34

Amount of contract.....	\$11,950 00
Paid on account of contract.....	6,721 85
Amount payable on completion.....	5,228 15

Tuzo Rock.

Estimated contents in cubic yards, 1,015.	
do cost of removal at \$25 per cubic yard.....	\$25,375 00

Dredger Rock.

Estimated contents in cubic yards, 475.	
do cost of removal at \$35 per cubic yard.....	\$16,625 00

I have the honor to be, Sir,

Your most obedient servant,

B. W. PEARSE,

Resident Engineer.

(Ref. No. 20,894.)

VICTORIA, B. C., 19th January, 1882.

SIR,—Adverting to my letter to you of 27th October last, I have the honour to report that, pursuant to your instructions to me by Department at letter No. 9,987 of 30th September last, the Government dredge vessels and tug steamer "Georgia" have been brought to Victoria and the repairs necessary to place them in effective condition duly carried out, and that dredging operations in Victoria Harbour were commenced this morning.

It was found on inspection that the tug steamer "Georgia" was in so leaky a state that she had to be hauled out, a new sternpost put on to her and other extensive repairs made to her hull.

It is estimated that these repairs will render her efficient for the service she is now employed in for about two years longer, but after that period of work she will probably become unfit for further service, and will certainly not be worth further repairing.

The whole cost of repairing the tug and dredge, which, as far as was practicable has been done by contract with the lowest tenders, will however not exceed the prescribed amount (\$3,400) appropriated for this purpose, including the wages of the crew of the dredger, who have been engaged since the beginning of November in cleaning and repairing the machinery of that vessel.

Before coming to a conclusion as to the most beneficial manner of employing the services of the dredger, I thought it desirable to obtain the opinions on this matter of the Board of Trade, the Harbour Master, and the Agent of the Marine and Fisheries Department here.

These authorities concur in recommending and urging that the dredge should in the first place be set at work in the inner harbour to remove the accumulation of deposit which is supposed to have resulted from the sewage of the town, and to deepen the channel along the wharf frontage.

I have accordingly directed that dredging operations should be commenced in front of the site of the proposed Dominion Government wharf, opposite the custom house, and continued along the city front as far as may be found advisable.

I have, however, serious apprehension that in consequence of the distance of the locality so proposed to be dredged from the mouth of the harbour, outside of which the dredged material has to be dumped and the consequent loss of time to the dredger in awaiting the return of the punts and tug, the cost per cubic yard of such dredging will be found to be excessive, as compared with that of continuing the dredging of the spit off Shoal Point at the mouth of the harbour where the length of towage would be diminished more than one half.

It is on this latter work that the dredge has been principally employed hitherto and as it is clearly most essential to the improvement of the harbour that its entrance should be straightened and deepened by the removal of this spit, I propose that the dredge shall return to this work as soon at all events as that in the inner harbour commenced on this morning has been completed, which should not occupy her more than two or three months at most; and should this latter operation, after working on it long enough to afford a practical test, prove too costly to be continued, as I fear may result, I propose to desist from it, and to set to work at Shoal Point spit forthwith.

Trusting this may receive your approval,

I have the honour to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

The Honourable

Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,

Minister of Public Works,

Ottawa.

(Ref. No. 21,112.)

VICTORIA, B. C., 25th January, 1882.

SIR,—With reference to my letter to you of the 19th instant, reporting that the dredge after having undergone thorough repair had been set to work to deepen the inner harbour and wharffrontage at Victoria, with the ultimate intention, after this has been accomplished, of resuming the operation, on which she was formerly engaged, of removing the bar at Shoal Point which impedes the entrance of vessels of any considerable draught into the harbour, I have the honour to represent that, in order to execute economically this latter work, which would probably take two years to complete, it is obviously necessary, as has been pointed out by Mr. Pearse in his successive annual reports, that provision should be made for carrying it on continuously throughout the year.

The unsatisfactory results of the contrary course, which has prevailed for the most part in former years, is so sufficiently shown by the statements accompanying Mr. Pearse's report of the 12th January, 1880, as to render further remark superfluous.

I beg therefore to recommend that, if it be determined to continue dredging improvements in Victoria Harbour, provision for such continuous work be made by an appropriation of a sum of not less than \$18,000 per annum, viz. \$15,000 for running expenses of the dredge and tow steamer (being at the rate of \$1,250 per month) and \$3,000 to cover repair and renewal of machinery and plant.

In connection with the dredging of Shoal Point spit, and in order that the fullest benefit may be derived therefrom, it is very desirable that the rock in mid-channel, known as "Dredger Rock," should be removed. The cost of the removal of this rock has been estimated by Mr. Pearse at \$16,625; but sufficient data to base a close estimate of the work upon does not appear to have been obtained by him, and in order to procure this information more fully, and also to determine the exact points at which dredging can be most advantageously carried on, it is very desirable that a hydrographical re-survey of this portion of the harbour should be made forthwith.

The cost of this survey would be probably not less than \$1,000 including the expense of boring through the superincumbent clay down to the surface of the "Dredger Rock" so as to ascertain the cubic contents of the portion of that rock which would have to be removed to give 14 feet ordinary low water over it.

I should be glad to have this survey undertaken this spring, and beg to ask your authority for such work within the limit of expenditure above stated, in addition to the salary of Mr. Gamble whose services I propose to employ in charge of it.

I have also to advise that four more punts be built to take the place of those now in use which are fast becoming worn out. Two of these punts should be supplied at once so as to prevent delay of the work in case of accident to those now in use. I propose to build these punts of a somewhat different model to the present ones, and estimate that they would cost \$750.00 a piece.

I beg to ask your authority to have two such punts built forthwith, and two more this summer, and that for the purpose of meeting the cost of these latter two, the sum of \$1,500 be added to the appropriation for next year's service in the improvement of Victoria Harbour.

The estimate for this service for the year 1882-83 would thus stand as follows:—

Dredging in Victoria Harbour.

Running expenses of dredge and dredge vessels at \$1,250 per month.....	\$15,000 00
Repairs of dredge and dredge vessels.....	3,000 00
Two new punts	1,500 00
Total dredging	\$19,500 00

Removal of "Dredger Rock."

Mr. Pearse's estimate..... \$16,625 00

I have the honour to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

The Honourable Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,

Minister of Public Works, Ottawa, Canada.

[Ref. No. 21651.]

VICTORIA, B.C., 9th February, 1882.

SIR,—In reference to the estimate submitted in my letter to you of the 25th ultimo of the amount that will be required to meet the expense of continuing dredging operations in Victoria Harbour during the fiscal year 1882-83, I have the honour to enclose herewith a statement of the persons employed and wages paid, and showing in detail the present total monthly expenditure on this work, which amounts to \$1,198.90 a month, to which I have added in my estimate \$51.10 for contingencies making \$1,250 a month and \$18,000 for the year's work.

I am unable to specify particulars as to the expenditure of the sum of \$3,000 proposed by me to be provided to meet necessary repairs and renewals of the plant and machinery.

Substantial repairs have just been effected, and it may be hoped that the expenditure of the whole of this sum may not be found requisite; but in a work of the character the machinery is constantly liable to break down, and it is most desirable that a fund should be available to meet such contingencies.

I have added to the estimate a separate item of \$1,500 for two new punts to be built after the 30th of June next, bringing up my estimate for dredging operations next year in Victoria Harbour to \$19,500.

In my letter above referred to of 25th ultimo, I have asked your authority to have two punts constructed immediately, making four new punts to be provided in all to take the place of those now in use which are fast becoming worn out, and also to have a re-survey made of the harbour at an expense not to exceed \$1,000. As these contemplated expenditures would, however, be in excess of the amount appropriated for dredging operations in British Columbia this year, I await your direction on the matter before incurring any expense on this account; but should you not consider it advisable to have these latter works undertaken immediately, I would beg to suggest that provision should be made for their execution after 30th June by the addition to the estimate for 1882-83 of the requisite amount to cover them, viz: \$2,500.

I have the honour to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

The Honourable

Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.

VICTORIA HARBOUR IMPROVEMENTS.

ANALYTICAL STATEMENT of work performed by the dredge in Victoria Harbour, B. C., from the 19th of January, 1882, to the close of the fiscal year ended 30th June, 1882, of which 117 days were dredging days.

Month.	Dredged material and number of punts.							Total of number of punts.	Capacity of punts in cubic yards.	Quantity dredged in cubic yards.	Cost.		Remarks.
	Hard clay.	Sand.	Clay sand.	Gravel and boulders.	Coal sand.	Coal and shingle.	Sand and shingle.				\$	cts.	
January.....	78	78	Cost shewn here does not include that of repairs. Taken from harbour along front of wharves.
February.....	120	.....	.....	.....	.....	.....	.....	120	.....	.....	.....	.....
March.....	158	40	42	.....	.....	.....	.....	240	.....	.....	.....	.....
April.....	.....	20	54	48	68	28	.....	218	18	11,808	4,388	88 42½
May.....	294	294	Taken from Spit off Shoal Point at harbour entrance. Cost shewn here does not include that of repairs.
June.....	.....	.....	.....	.....	.....	.....	292	292	18	10,548	2,470	84 22½
	356	60	96	48	68	28	586	1,242	.....	22,356	7,459	72

Dredging.....\$7,459 72
Repairs.....3,372 98

Grand total.....\$10,832 70

F. C. GAMBLE,
Assistant Engineer.

VICTORIA, 5th August, 1882.

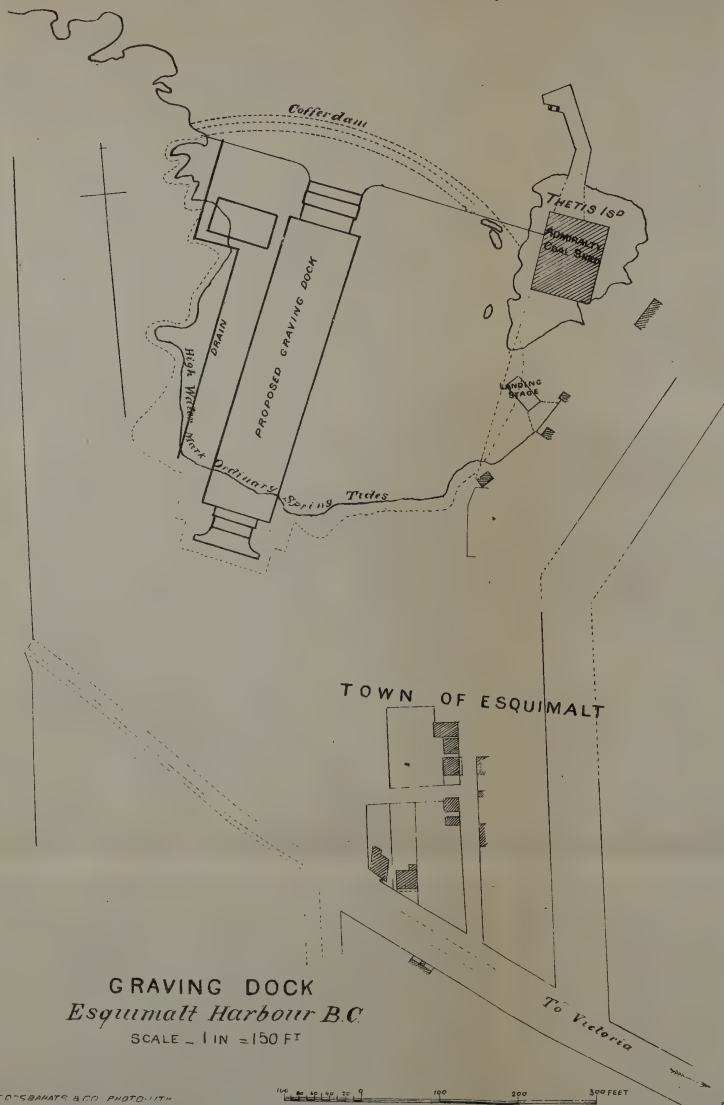
STATEMENT showing present current monthly expenditure in connection with dredging operations in Victoria Harbour, with estimate for twelve months' work from 1st July, 1882, to 30th June, 1883.

Name.	Capacity.	Rate of wages.	Amount.	Totals.
		\$ cts.	\$ cts.	\$ cts.
Upon Dredge :—				
Robert Dexter.....	Superintendent	125 00	125 00	
William Steele.....	Engineer	100 00	100 00	
George Gardner.....	Fireman.....	50 00	50 00	
John Geider.....	Blacksmith	50 00	50 00	
Upon Tug "Georgia" :—				
William Scott.....	Captain	50 00	50 00	
Robert Wickens.....	Engineer	70 00	70 00	
Upon Dredge :—				
Charles Repath.	Carpenter and deck-hand...	50 00	50 00	
John Ramsay.....	do do ...	40 00	40 00	
Nicholas Sylvers.....	do do ...	40 00	40 00	
William Saunders.....	Cook.....	40 00	40 00	
James Griffiths.....	Deck-hand.....	40 00	40 00	655 00
Provisions (about) per month.....				200 00
Fuel—Coal 30 tons, at \$5.25			157 50	
Wood, 26 cords, at \$3.90.....			101 40	
				258 90
Water supply, per month.....				10 00
Sundries—Lumber, nails, iron, rope, oil, tallow, cotton waste (about).....				75 00
Actual current monthly expenditure.....				1,198 90
Add—For contingencies (say)				51 10
				1,250 00
Giving estimated expenses of working dredge in Victoria Harbour for 12 months from 1st July, 1882, to 30th June, 1883.....			15,000 00	
General repairs.....			3,000 00	
Two new mud punts.....			1,500 00	
Total estimate for dredging and dredge repairs, Victoria Harbour Improvements for 1882–83.....				19,500 00

JOSEPH W. TRUTCH.

Victoria, B. C., 10th February, 1882.

CONSTANCE COVE



GRAVING DOCK
Esquimalt Harbour B.C.

SCALE - 1 IN = 150 FT

APPENDIX No. 17.

REPORT ON A SURVEY

MADE OF THE

FRASER RIVER, B.C.,

BY

HON. B. W. PEARSE AND G. B. WRIGHT,

ALSO REPORT OF WORK DONE FOR THE

IMPROVEMENT OF COTTONWOOD CANON,

UPPER FRASER RIVER,

BY

Hon. B. W. PEARSE and G. B. WRIGHT,

WITH A

STATEMENT OF WORK REMAINING TO BE DONE; AND ALSO REPORT
BY HON. J. W. TRUTCH AND GEORGE TURNER ON THE
DREDGING OPERATIONS CARRIED ON IN THE
FRASER RIVER.

APPENDIX No. 17.

SURVEY OF THE FRASER RIVER.

(Reference No. 47,668.)

PUBLIC WORKS DEPARTMENT,
VICTORIA, B.C., 8th January, 1875.

SIR,—I have the honour to submit, for the information of the Honourable the Minister of Public Works, enclosed herewith, a copy of the report of Mr. G. B. Wright, dated 22nd ult., on the works which, in his opinion, should be undertaken to improve the navigation of the Fraser River between Big Bar, (30 miles above the town of Lilloet), and Soda Creek.

In making the survey of the river, Mr. Wright was assisted by an engineer of very great experience in works of a similar character, in Oregon and elsewhere, Mr. Isaac Smith, C.E. As I have pointed out in previous letters, Mr. Wright is a man of extensive experience in steamboat navigation on the Fraser and other rapid rivers, whose opinion, in any question of this nature, would naturally carry great weight.

The general result of the survey of this river, in regard to its velocity and fall, (*vide* last page but one of report), is borne out by the most accurate information in my possession, which is that mountain torrents having an inclination of 37.27 inches per mile would have a velocity of 480 feet per minute, or 5.45 miles an hour.

Mr. Wright's estimate for the removal of all the obstruction to navigation, now existing in the river, excepting only the formidable one at Big Bar Canon, amounts to \$98,500, or say, including inspection, etc., \$100,000.

The benefit which might be reasonably expected to accrue to the Province, by rendering the navigation of the river practicable for steamboats, must be immense, if we consider the facilities of the upper country for growing wheat, which I am assured has been grown, weighing sixty-five pounds to the bushel, and averaging two tons to the acre, or in round numbers, sixty-seven bushels to the acre. I am collecting some statistics of what has been done in the Upper Columbia, in the way of improvement, and in the results thus obtained of exporting wheat to England, which I am sure will prove interesting, and of value in the consideration of the question of the improvement of the Fraser River.

The cost of this survey has exceeded, by about \$700, the amount estimated in my letter dated 20th July, 1874.

I will send the supplementary report of the Big Bar Canon as soon as possible.

I have the honour to be, Sir,

Your most obedient servant,

B. W. PEARSE,

Resident Engineer.

F. BRAUN, Esq.,

Secretary Public Works Department,
Ottawa.

G. B. WRIGHT'S REPORT.

VICTORIA, B.C., 22nd December, 1874.

SIR,—I have the honour to present a report of my survey of the Fraser River, from Soda Creek to a point below Big Bar, undertaken by me in accordance with your letter of instructions, dated September 17th, 1874.

In doing so, a brief description of the nature of obstructions to navigation which exist in this stream will not be out of place.

The rapidity of the current of the Fraser changes greatly and not uniformly at its different stages of water. During its lowest stages rapids are caused almost invariably by rocks which dam the stream; as the water rises the current becomes equalized and, the obstructions lying much farther below the surface, these places differ but little from the rest of the river; the average rate of speed, however, is greatly increased by high water, and the portions of the stream most difficult to ascend at this time are found in the narrow canons. Here sharp points of rock always project through which the water rushes rapidly forming powerful eddies and whirls. Naturally the water is greater above these canons than below, and a strong current is thus produced. It, therefore, happens that places which in low water are extremely rapid are quite easy in its highest or intermediate stages, and on the contrary canons through which one can pull a row-boat against the current in low water become very difficult at high. The latter places cannot be improved except by an amount of work which I think is not at present contemplated. Fortunately the extreme stage of high water lasts but a short time, say from one to three weeks, and immediately following its subsidence the canons become passable again.

My report will, therefore, be devoted principally to a description of the low water rapids; but accompanying it I give plots of the different canons which were generally sluggish when I visited them, with remarks upon their probable condition at the highest stage. I also give the strength of the current in different places as we found it at a comparatively low stage of water. The miles in my current rates and in my traverse are statute miles.

SODA CREEK CANON

Commences $1\frac{3}{4}$ miles below the town of Soda Creek and is comparatively straight. For a distance of three quarters of a mile from its upper end the current does not exceed eight miles per hour. At this point a rock near the right bank obstructs the passage of the water, and contains 1,653 cubic yards, and below this and nearer the shore a smaller rock containing ninety-two cubic yards, both of which require to be removed. Upon the left bank a shelf of bed rock sixty feet in width, entirely bare at a low or intermediate stage of water, reduces the width of the channel to 180 feet through which the water pours at the rate of fourteen miles per hour. Our soundings in this channel gave us 18 feet at the lowest stage. The fall in the canon is 6.80 in a distance of $1\frac{3}{4}$ miles, its extreme length, three feet of this occurring in a distance of 250 feet. By removing these two rocks to a depth of nine feet below low water, we should have a channel 210 feet wide in its narrowest place, with an area of at least 3,000 square feet. I estimate that the removal of these rocks would make the fall uniform and reduce it to four feet per mile giving a current of about eight and a half miles per hour; the portion of these rocks which lies above low water embraces 10.19 cubic yards and should be removed to a point marked Y on the plot, or to the lower end of the canon and deposited there in the extreme edge of the river. The remainder could be removed into deep water below the rocks, or to the middle of the stream, where no bottom is found at ten fathoms, without obstructing the current.

The rock is a loose shaly slate, of fine grain, and would be broken into small pieces by blasting. It is easily drilled, but a blast would not do much execution, as it would not throw out large pieces of rock.

The difference between extreme high and low water in Soda Creek Canon is 25.55 feet. Ordinary high water is six feet less. The banks are mostly slate rock, precipitous, and rising 200 feet above the river. Where the banks are gravel they stand at an angle of 50°.

Below the rocks to be removed the current is not rapid, but in high water large and powerful eddies exist.

CHIMNEY CREEK CANON

Is situated 23.4 miles below Soda Creek. Its length is 0.73 miles, its narrowest place 177 feet, and the rapidity of the current at its upper end 12.50 miles per hour. Below this the water is extremely sluggish at low water, and in no stage do I think any difficulty would be experienced. At the mouth of the canon a rock, estimated to contain 11.3 cubic yards above water and 100 below, to a depth of nine feet, should be removed. The portion above low water should be taken below the canon, and the remainder might be deposited in the deeper part of the stream, in which we found no bottom at ten fathoms.

It is probable that a steamer with a speed not over twelve miles per hour might be compelled to seek the aid of a tow line for a boat's length at the upper end of the canon.

CHILCOATEN CANON

Is situated 52.42 miles from Soda Creek. The current here is so sluggish in low water that two men can easily row a small boat against it. At the lower end the water is confined in a channel 140 feet in width, which bends sharply to the east. In the season of high water I should judge that the current would be rapid at this point with strong eddies. There would be nothing, however, to prevent a powerful steamer from making the passage safely. No obstructions occur in the canon which require removal.

AT ALKALI RAPIDS,

58.92 miles from Soda Creek, the current tests indicate a speed of only 5.85 miles per hour. The river here is rough, but not difficult for a steamer. The fall is 1.50 feet in a distance of 508 feet.

LITTLE DOG CREEK RAPIDS

Are situated 61 miles below Soda Creek, at the head of the canon of the same name. The fall here is 3.03 feet in a distance of 600, and the rapidity of the current 14.83 miles per hour for a distance of 350 feet. Unfortunately I was prevented from completing my examination of this place by the canon below being closed by ice, and the water rising several feet. I think that with the aid of a line a steamer could always make this passage, as the channel is straight and free from eddies. The canon below is very easy. A further examination of this rapid would probably show that like all the other rapids it could be improved by removal of rocks if found too strong for navigation.

The fall of the river between a point a little above the mouth of the Chilcoaten River and the lower end of Little Dog Creek Rapids is 28.17 feet for a distance of 4.75 miles, average 5.93 feet per mile. In this stretch is included the two last named rapids. In the stage of high water the current here is equalized, and probably stronger than in any other portion of the river for an equal distance. I estimate that it will average at that time from eight to nine miles per hour, and that Little Dog Creek Rapids will not exceed eleven.

CANON CREEK RAPIDS,

Situated 81.75 miles below Soda Creek, and directly opposite the mouth of Canon Creek, have a fall of 2.68 feet in a distance of 200 feet. Rapidity of current, for a

distance of 150 feet, 9.02 miles per hour; at the culminating point, for a distance of 50 feet, it reaches 12 miles per hour. These rapids are caused by two rocks, one situated 20 feet from the right bank about 40 feet in length and 20 in width, covered by 2 feet of water at lowest stage. The other is 40 feet from the left bank, 70 feet in length and 18 feet wide, coming to a point at both ends, a small portion of it rising 2 feet above low water. I estimate its contents at 300 cubic yards. The latter is slightly porous, not very difficult to drill, and will break in large masses when blasted. I should recommend its entire removal from the bed of the river to a depth of 9 feet below low water mark, and estimate the maximum current at any point after this removal at 8½ miles per hour.

CHINA GULCH RAPIDS,

87.05 miles below Soda Creek, render navigation in certain stages exceedingly difficult, especially for a steamer bound down stream, on account of an abrupt bend to the right 200 feet below them, where the whole force of the stream precipitates itself against a perpendicular rock, which forms the left shore.

These rapids were undoubtedly produced by an immense slide of earth and rocks from the right bank which probably completely dammed the river for a time, turning it from its original course and causing it to wear away the opposing shore. This slide is still moving slowly, but continually, as the water washes away its base. As it has been worn down by the action of the current it has left a reef of large boulders of trap rock, extending within 90 feet of the left bank. The main rock which obstructs the channel has a length of 120 feet and maximum width of 28 feet. Its lower end is 6 feet above low water, its upper end from 2 to 4 feet below. This should be removed to a depth of 9 feet below low water, making 500 cubic yards to be taken away. Between it and the right bank a reef of boulders, containing from 20 to 50 cubic yards each, should also be removed for a depth of 9 feet below low water, and for a width of 75 feet. Below this reef the bar should be removed partly by blasting and partly by dredging for a length of 125 feet and width of 75 feet. The bottom to be left sloping from 9 feet at its outer edge to 4½ feet, upon the edge nearest the right bank. All of this material should be taken entirely below the canon to some place to be designated.

I estimate the cubic yards to be removed as follows:—

	Cubic yards.
Main rock in centre of River, - - - - -	500
Reef of boulders towards right bank, - - - - -	800
Rocks and gravel in bar below, - - - - -	2,000

BIG BAR CANON,

Situated 102 miles below Soda Creek, is the most serious obstacle to navigation which exists in the section under examination. It is 1.32 miles in length, and describes nearly a semi-circle. The fall from smooth water above to the lower end of the canon, a distance of 1.68 miles, is 16.4 feet or about 10 feet per mile, of which 4.7 feet occur in a distance of 500 feet. This great fall is caused by a reef of concrete rock which extends entirely across the stream, broken in one place near the left bank by a channel 60 feet wide running diagonally across it.

Although the fall is so great, the current tests indicate only 5½ miles per hour for one fourth of a mile. Maximum current for 200 feet, 10 miles per hour.

The width of the stream at the rapids is 600 feet. At the lower end of the canon the banks approach each other within 140 feet. It is probable, therefore, that in high water the current at the present rapids is not very strong, but at its narrowest point its force must be very great.

The right bank of the river is a red rotten sandstone, almost perpendicular, and 160 feet in height. The left bank throughout is composed of cemented sand and gravel, rising at an angle of 75° from 500 to 800 feet.

I consider this canon is impracticable for the purposes of navigation, unless a very large amount of rock is removed for a long distance up stream. Opening a channel of 9 feet in depth and 150 feet in width through a reef, would cause a fall in the water above of 3·5 to 4 feet and bring near the surface several rocks which do not now obstruct the channel.

I have deemed it best to make a separate and more detailed report upon this portion of the work and its probable cost, (to be submitted hereafter).

Should it be desirable to extend the navigation of the river still further down, no work would be required from the lower end of this canon to Big Slide Creek, a distance of $8\frac{1}{2}$ miles, or 109 miles from Soda Creek. This point is situated within 30 miles of the town of Lilloet, and a branch road could be made connecting with the present waggon road in a distance of 10 miles. It would be necessary to construct a railway, tramway, or waggon road around Big Bar Canon on the right bank. A waggon road 18 feet wide would rise 250 feet above the river, and would be $1\frac{1}{4}$ miles long. Its probable cost would be \$3,000. A good landing for steamers can be obtained above and below. Steamers can now be taken up or down through Big Bar Canon by means of capstans constructed on the left bank at convenient distances.

They would be unable to carry a load of freight up stream.

Wood's Canon is situated 119·77 miles below Soda Creek. Its length is 0·8 miles and its narrowest point is 180 feet wide. Its current is not rapid and no obstructions exist which require removal.

From this point to Big Slide Creek, a distance of 8·5 miles, no current tests or soundings were made, and the courses of the river were run by prismatic compass, the distances being estimated.

No work is required to render this portion of the river navigable.

The strongest current, I think, does not exceed 8·5 miles per hour.

From a series of barometrical observations taken at Soda Creek and at various points of the river at 9 a.m., 12 m., and 5 p.m. each day, I make the fall of the river from Soda Creek to Wood's Canon to be 408 feet, an average of 3·40 feet to the mile.

Our current observations (except in the rapids above described) show an average rate of five miles per hour; the maximum speed is 8·54, the minimum three miles per hour.

The average distance between high and low water is 22 feet. The maximum difference is 32·13 feet.

I established the latitudes of various points by observations of the sun and stars. The result of these observations is entered in the maps accompanying this report.

In conclusion, my estimate of cost for these different points above mentioned and the amount of work which I have recommended is as follows:—

Soda Creek Canon.....	\$35,000
Chimney Creek Canon.....	6,000
Canoe Creek Canon.....	9,000
China Gulch Canon.....	48,500

I would suggest, however, that a more accurate examination of the latter place be made before any contracts are given.

I have the honour to be, Sir,

Your most obedient servant,

G. B. WRIGHT.

Hon. B. W. PEARSE,
Resident Engineer.

SUPPLEMENTARY REPORT, FRASER RIVER SURVEY.

(Ref. No. 50,463.)

PUBLIC WORKS DEPARTMENT,
VICTORIA, B. C., 4th May, 1875.

SIR,—I have the honour to transmit herewith a copy of Mr. G. B. Wright's supplementary report on the Big Bar Canon of the Fraser River, showing the nature of the obstructions to the navigation of the river at that point. Mr. Wright estimates the cost of removing 4,000 cubic yards of rock at \$100,000, but I think that this estimate is far too high, even for work carried on so far in the interior. It appears that a road or tramway can be built from the reach below to that above, not exceeding two miles in length, at a cost of about \$3,000 to \$4,000, with a good landing at each end. With a view to show what has been done in Washington Territory by the improvement of the Columbia River, in developing the country, I desired Mr. Wright to obtain some statistics bearing upon this subject, the general results of which I now lay before you for the consideration of the Honourable the Minister of Public Works. One cannot fail to observe the general similarity between the Columbia and Fraser Rivers, in their course, nature of obstructions and source, as well as in the fact that both flow through the Cascade range of mountains in their passage to the sea. The upper waters of both are sluggish and well adapted to steamboat navigation. In the Columbia, the first serious obstacle occurs at the Cascades, where a railway five miles in length has been built to avoid rapids considered incapable of improvement. Another portage occurs forty miles above this point, from the Dalles to Celilo, a distance of thirteen miles. A railway has been built here. From this point the river is navigable, at all stages of water, to Wallula, a distance of 140 miles. At high water steamers ascend 160 miles further to the town of Lewiston. Large sums of money have been, and are still being, expended in blasting and removing rocky obstructions from this river.

Prior to the improvement of the navigation of the river and the construction of the two railways before mentioned, freight was carried from Portland up to Wallula for \$100 a ton. The rates are now as follows:—

From Portland to Wallula, 235 miles.....	\$20 per ton.
“ Wallula to Portland, “	\$ 6 “

There was *no down freight*, as the rate was prohibitory, although the country was admirably adapted for raising wheat.

The effect of the improvements to navigation is shown by the tonnage, chiefly wheat shipped during the last three years, viz.:

	Tons.
In 1872.....	1,500
“ 1873.....	6,200
“ 1874.....	9,600

In the opinion of those most capable of judging, the impetus thus given to farming will increase the exports of grain from the country *east of the Cascade Range*, until, in a year or two, they will exceed those of the far-famed Willamette Valley.

Upon the Fraser the first impassable canon is found at Yale. From that point to Boston Bar, a distance of 25 miles, the river may be said to be non-navigable. A good waggon road covers this ground. From Boston Bar to Bridge Creek, 65 miles, some small expenditure would be requisite, but the river may be said to be navigable between these points. From Bridge Creek to a point 1 mile above Pavillion Creek, another portage might be necessary. This distance would be about 20 miles. From this point, if the improvement should be made at Big Bar Canon, and the other works carried out, as shown in my letter dated 8th January, 1875, a steamer could run to

Cottonwood Canon, 20 miles above Quesnelmouth, a stretch of 210 miles. These improvements would open up the principal grain producing region of the interior, which may be estimated at not less than 200,000 acres, capable of producing at least 300,000 tons of wheat per annum! Now it is a desert, owing to its inaccessibility and the exorbitant rate of freights.

As it seems not improbable that the route for the Canadian Pacific Railway may be located in the Fraser Valley from Fort George to Tête Jaune Cache, it may be expedient to refer to the Cottonwood and Fort George Canons, which are the chief impediments to the navigation of the river for a distance of 180 miles above Quesnelmouth. Mr. Wright has taken a steamer of 100 tons burthen through the former at extreme low water, and through the latter at its highest stage. Both of these canons can, at a moderate cost, be so improved as to admit of navigation being carried on during the whole of the summer, thus making the whole stretch navigable for a distance of 370 miles. The whole cost of these improvements would be saved, it is believed, in the cheaper transport of the materials requisite for the construction of the line of railway. The immediate effect of them in developing the resources of the Province cannot be over-stated, and it is no wild dream to foresee that when they are effected, this Province will be able to ship wheat to Europe from the very interior, and will be able to compete with the wheat growers of the adjoining Territories and States.

I have the honour to be, Sir,
Your most obedient servant,

B. W. PEARSE,
Resident Engineer.

F. BRAUN, Esq.,
Secretary, Public Works Department,
Ottawa.

MR. G. B. WRIGHT'S SUPPLEMENTARY REPORT.

VICTORIA, April 29th, 1875.

SIR,—I have the honor to present herewith a plan of "Big Bar Canon."—The position and size of the rocks which obstruct the channel, (represented by the dotted red lines), are approximate only. The limited time at my disposal, and the want of larger boats, made it impossible for me to measure them accurately. To do so, at least 2 months would be required, with a force somewhat larger than mine, and boats better adapted to the work.

At the main fall, I estimate that 4,000 cubic yards of rock should be removed. This would make a channel 150 feet wide and 9 feet deep at low water. Different rocks for a distance of 500 feet would require to be blasted, two of which are marked *a.* and *d.* in the plan. Other rocks would undoubtedly be uncovered by the falling of the water which now escape notice. I think that the maximum strength of the current after removal of these obstructions would not exceed 12 miles per hour. All the rocks composing the main ledge are conglomerate, and easily drilled. The one marked *c.* is partly bare at low water and *b.* is only covered to the depth of a foot. The great depth of the river at this point would make it sufficient to remove the rocks sideways, simply to leave the channel clear. I estimate roughly the cost of the work at this point at \$100,000:—one entire season and perhaps two would be required for its completion.

I have &c.,
G. B. WRIGHT.

HON. B. W. PEARSE,
Resident Engineer.

REPORT ON IMPROVEMENT OF COTTONWOOD CANON, UPPER FRASER RIVER, B.C.

(Reference No. 3972.)

PUBLIC WORKS DEPARTMENT,

VICTORIA, B.C. 8th March, 1880.

SIR,—I have the honour to transmit herewith, for the information of the Hon. the Minister of Public Works, a copy of the Report made by Mr. G. B. Wright on the work performed at Cottonwood Canon, in Fraser River, together with a copy of his report upon the work still remaining to be done to render the river at this point navigable for light draught steamers.

I also append tracings of the plans furnished by Mr. Wright, showing the position and size of all the rocks in the canon, and a section of the river itself.

The amount expended on this work has been:

Tools and implements.....	\$3,062 01
Powder.....	500 00
Scows and boats.....	600 00
Wages and provisions.....	4,262 72
Transport, men and materials (materials, 6 cts. per lb).....	1,309 04
Stationery.....	35 00
Miscellaneous	228 23
	<hr/>
	\$9,997 00

I append a list, marked "Schedule A," of tools, boats, &c., stored at Quesnel, which will be available for future service.

Also, list marked "Schedule B," of articles, with their values, left at the canon, which it was found impossible to get down to Quesnel.

The following is an estimate of the cost of completing this work, based upon past experience, and upon the assumption that the tools and stores now in hand will be used in the work.

Estimate of cost of completion:—

	Cub. yds.	
Rock "N" } Flinty.....	171	at \$30 per cubic yard...\$5,130 00
" "O" }		
" "I" ".....	124	
" "L" ".....	5	
" "K" Granite.....	40	
	<hr/>	
	169	at \$12 per cubic yard... 2,028 00
	<hr/>	
Rock "B" Slate.....	230	
" "C" ".....	110	
" "P" ".....	150	
	<hr/>	
	490	at \$12 per cubic yard... 5,880 00
	<hr/>	
Rock "A" Granite.	506	
" "B" ".....	191	
" "2" Slate.....	104	
" "3" ".....	94	
" "M" Boulders....	150	
" "G" Granite.....	352	
	<hr/>	
	1,397	at \$6 per cubic yard 8,382 00
		<hr/>
		\$21,420 00

I estimate the value of the plant and materials in hand at about \$3,250; the total expenditure has been \$9,997; the total amount of rock blasted and removed has been 564 cubic yards, which gives us at the rate of \$12 per cubic yard. This cannot but be considered as a good result, in view of the enormous cost of transport, high rate of wages, provisions, etc., which obtain in the interior of the mainland of this Province. It costs \$4 to \$4.50 per cubic yard to blast the rock in and near Victoria, and it has cost Mr. Spence, the contractor for the "Beaver" rock in this harbour, from \$16 to \$30 per cubic yard.

If it be determined to proceed with this work, it will be well to place the sum of \$10,000 on the Estimates for this year, and the balance, say (including supervision and cost of examination of work) \$12,000, on the Estimates for 1882-83.

I have, etc.,

B. W. PEARSE,
Resident Engineer.

S. CHAPLEAU, Esq.,
Secretary, Public Works Department,
Ottawa.

MR. G. B. WRIGHT'S REPORT ON WORK PERFORMED AT COTTON-
WOOD CANON, FRASER RIVER.

VICTORIA, B.C., 20th March, 1880.

SIR,—I have the honor to present my report of work performed on the Cotton-wood Canon, in accordance with your letter of instructions dated September 12th, 1879.

My blasting operations were commenced on the 13th of October, previous to which time I had been constructing buildings for protection against the cold, and a powder house which could be kept at a uniform temperature of about 50° F. to prevent the dynamite from freezing. We ceased blasting December 10th. During the latter part of October the river rose 15 feet, a height hitherto unprecedented at that season of the year. This, of course, caused a temporary suspension of our work for several days. On the 28th November the canon was closed by ice. After this time, the fluctuations in the stage of water caused by float ice rendered our work very irregular. Frequently the stream would rise in half an hour from one to three feet, as the ice was dammed below, and fell as rapidly when the obstructions were washed away. In December the extreme cold caused the formation of "anchor ice" upon the bottom of the river, and the water rose gradually to a height of seven feet above low-water mark. In descending the river after the cessation of work, I passed over a ridge of anchor ice extending quite across the river, the thickness of which I estimated at seven or eight feet.

I have blasted and partially removed 564 cubic yards of rock, of which 284 yards were removed from the points "F" and "V" and 57 yards from the rock "G", into the deep channel. The low-water rocks "T" and "U" containing 132 cubic yards were thoroughly shattered by blasts, and left in heaps for the rapid water and ice to carry away in the spring. About 90 cubic yards in rocks "N" and "I" were blasted and left to the action of the current. As the channel is deep upon all sides of these rocks there is no doubt that every vestige of broken rock will be carried away by the spring freshet.

I recapitulate the quantities:—

Point "F"	250	cubic yards removed.
" "V"	35	" "
Rock "G"	57	" " and blasted.
" "T"	57	" " "
" "U"	75	" " "
" "N"	40	" " "
" "I"	50	" " "

564

In accomplishing this work I used 663 lbs. of Giant and Hercules powder—300 bushels of charcoal, and consumed 269 lbs of steel. My pay-lists amounted to \$3,922.22, a considerable portion of labor being expended in constructing houses for cooking and sleeping in, and in removing the plant and tools to Quesnel after the work was suspended.

I used Giant powder, No. 1, and Hercules powder, No. 1. I found the former more easy to explode, more susceptible to the influence of extreme cold, more speedy in its action, and more effective in acting in a downward direction. I consider it much the better agent to employ in moderate weather. The Hercules powder seemed equally as strong in its effects, but does not break the rock deeper than the drill holes. It is more lateral in its action. All dynamite must be somewhat affected by the temperature in winter blasting, even when exposed but a few moments to the cold. The Hercules loses less of its force when frozen, than the Giant, and I think it less dangerous to handle. In one instance, a cartridge which had for 11 days been exposed to a temperature varying from 13° to 30° Fahr. did excellent execution when exploded.

Our electrical battery worked very satisfactorily, but was useless on account of the inefficiency of the exploders. When charges of either Giant or Hercules powder had been exposed for a few moments to the cold the detonators would burst and break the cartridges without exploding them. With proper detonators I think the battery could be safely depended upon to discharge from four to six blasts simultaneously. The Bickford treble tape fuze never failed, although often extending several feet under water, but it was impossible in using fuze to obtain simultaneous explosions of all the blasts. In some instances when using Giant powder, the shock of one blast would discharge the others.

The sizes of the drill steel which I employed were 1 inch, 1½ inch, and 1¾ inch. The bits were three inches in width, striking hammers 8½ and 9 lbs. each. Three men formed a "gang," and the distance sunk in a day varied from 18 inches to 6 feet in depth. It would average about 3 feet. Our cartridges were placed in heavy tin tubes of 2 inches diameter, water-tight, and closed at the top with a wooden plug, if intended for complete immersion. It was necessary to fill these tubes in the powder house, otherwise the explosive substance, if it touched the frozen side of a drill hole would adhere firmly, and require great pressure to force it to the bottom.

The rock at the upper portion of the Canon, including rocks "A," "K" and "G," consists of a hard, compact granite. The remainder is of a slaty texture of which portions can be easily drilled. It is, however, interspersed with strata of flinty rock, resembling marble, and exceedingly hard. The rocks "N" and "I" are entirely of this nature.

I erected a bench mark "A" on the right bank of the river 6¼ feet above high water and 33½ feet above low water. My water-gauge is a broad, flat iron solidly bolted to the rock near eye-bolt "I," as indicated in the chart, and plainly marked in feet and inches. I have sunk into the rocks to a depth of eighteen inches, eye-bolts marked from I to V, along the proposed line of cutting; their position is also indicated in the chart.

I found the fall of water from rock "A" to rock "G" to be 4½ feet, 17 inches of which is caused by the obstructing point "A" and the rock "G," which confines

the channel into a space of 220 feet in width. The remaining 34 inches was caused by the rock "N," and the projecting point "F" which has been removed.

Opposite the rock "N" the rapidity of the current in the south channel is 7-8 statute miles per hour. In the north channel it is 8-50.

The autumn of 1879 was very unfavorable for the prosecution of the work. The river remained at a very high stage until the middle of October, and the unusual rise which occurred at the end of that month kept the water up until the close of the season.

The scow which I procured is too small for the purpose. A new one, sixty feet in length and 18 feet in width, with long sloping bow and stern, and $4\frac{1}{2}$ feet depth of hold, will be required to continue the work. The present one can be used to good advantage in removing the rock when blasted.

I have deemed it best to present in a separate report the work which I consider necessary to complete the improvement of the river at this point. Accompanying there are two charts of the canon plans, and sections of the various rocks to be removed, and a cross section of the river at the point where the greatest obstruction exist.

Should a further appropriation be made for this purpose, and the work be given out by contract, I would suggest that the contract be given out as early as possible in this season. The system of hand-drilling is exceedingly slow and expensive, and drilling by steam is absolutely essential. The length of time during which the water is at a proper stage for working is so short that great expedition is necessary in sinking the holes. It will also be advisable to procure from the manufactories dynamite packed in cartridges larger in size than that usually sold upon this coast and, if possible, encased in gutta percha coverings. In many cases, this would avoid the use of tin tubes to enclose the explosive material. The entire contract should be given to one party, although the work will necessarily extend over two seasons, in order that the size of the contract may enable him to purchase the proper machinery. I would also suggest that the contractor be allowed to use the boats, buildings and tools belonging to the Government, paying at cost price for any materials consumed.

I append a list of tools, boats, materials, etc., the greater portion of which are stored at Quesnel. As I presume that any future work which may be performed here will be done by contract, I have left directions at Quesnel that sales should be made of articles there at a stated list of prices. I have arranged that the perishable goods which still remain at the canon shall be removed to Quesnel whenever the navigation opens in the spring.

The extreme difference between high and low water at the canon is twenty-seven feet three inches; the fall, from a point situated 1,000 feet above rock "A" to the lower end of the canon, is six feet six inches.

All the measurements upon the plans and sections are in feet and inches. The red lines indicate the limits of the proposed cuttings, the spaces which are colored yellow show the rocks which were blasted by myself.

Low-water line is intended to correspond with the extreme lower end of the iron water-gauge. For a few hours after the ice began to run the water fell about a foot lower, but it was caused evidently by a jam of ice above. At any stage when steamers will be able to run, the water will be at least three feet above low-water mark.

My entire expenditure in the work has not exceeded the amount appropriated amounting to the sum of \$10,000, as you will perceive by the vouchers which I have from time to time handed to you.

I have, &c.,

G. B. WRIGHT.

HON. B. W. PEARSE.

Resident Engineer.

MR. G. B. WRIGHT'S REPORT ON WORK REMAINING TO BE DONE AT
COTTONWOOD CANON, FRASER RIVER.

VICTORIA, B. C., 25th March, 1880.

SIR,—In specifying the work which I consider necessary in order to render Cottonwood Canon navigable for powerful stern-wheel steamers, I will state that there are two classes of obstructions to navigation, viz., those which render the river difficult or impossible in a high stage of water, and those which render it difficult but not impossible in a low stage of water.

The former consists partly of high projecting points which confine the water into a narrow space and create powerful eddies, and in some places extremely rapid currents, through which it is dangerous to attempt to take a steamer, owing to the difficulty of steering. The low water obstructions are rocks which are situated in the channel itself, some of which make their appearance above the surface at a medium stage of water and others not at all. Naturally then, low water rocks also have their influence in creating eddies during the high stage.

By reference to the charts of the river which accompany this report, it will be seen that the most formidable low water obstruction is the rock "N." This rock is about 60 feet in length and 40 feet in width, lying a little diagonally across the stream, distant 100 feet from the south bank, and forming a partial dam to the rapid current. The depth of the south channel varies from 10 to 18 feet, and the north channel is about 20 feet. The rock falls abruptly to a depth of 30 feet, both above and below. The south channel is the one followed by boats, and would be the steamboat channel if the rock were removed. At low water the rock projects above the surface 8 inches. At any stage when steamers are likely to run on the river, it is covered by 2 or 3 feet of water.

Estimating to a depth of 6 feet below low water mark, the depth to which it will be necessary to remove this rock, it originally measured 208 cubic yards. Forty cubic yards have been blasted away, leaving 168 yards yet to be removed. The rapid current will carry away the rock as fast as it is thoroughly broken, leaving it in the deep portion of the river below.

A small rock, "O," situated 10 feet below "N," near its southern point, containing about 3 cubic yards, should also be blasted to a depth of 6 feet below the low water mark.

The rock marked "I" originally contained 174 cubic yards, of which 50 have been blasted away. This rock should be removed to a depth of 4 feet below low water mark. The water is deep above and below at a medium stage; the difference in the heights of water above and below this rock is 13 inches.

The foregoing rocks are extremely hard to drill, being composed of a flinty rock somewhat resembling marble after it is blasted.

The rocks "G" and "K," containing 352 and 40 cubic yards respectively, and the point "A" at eye-bolt "I" reduces the channel of the river to 220 feet in width. They are a hard granite difficult to drill, but I judge will blast well. The rock "G" can be deposited after being broken in the deep channel just below.

The point "A" will have to be transported on scows below station 4 and deposited in the deep channel.

The various points "B," "C," "D," "2," "3" and the small rock "L," also some small unmeasured rocks within the dotted red line at "P" estimated at 150 cubic yards, also some loose boulders at the point "M" will also have to be removed below rock "N" and deposited in the channel when the depth is not less than 30 feet.

The plans and sections which accompany this report show the shape and dimensions of the various rocks. The red lines indicate the outside line of cutting. The measurements upon the plans are in feet and inches.

Accompanying this report, I also hand you a recapitulation of work necessary showing the rock as designated in the chart, the dimensions and character of each and the depth below low water mark to which each is to be removed.

I have, &c.,

G. B. WRIGHT,

HON. B. W. PEARSE,
Resident Engineer.

Rocks to be removed from Cottonwood Canon.

Designated in Chart.	Nature.	Cubic Yards.	
"N".....	Flinty.....	168	To be removed to a depth of 6 feet below low water.
"O".....	do.....	3	do 6 do
"K".....	Granite.....	40	do 6 do
"I".....	Flinty.....	124	do 4 do
"G".....	Granite.....	352	do 1 do
"L".....	Slate.....	5	do 3 do
"A".....	Granite.....	506	do 3 do outside of line D, remainder to low water.
"B".....	Slate.....	230	To be removed to a depth of 3 feet below low water, outside of line F, remainder one foot below low water.
"C".....	do.....	110	To be removed to a depth of 3 feet below low water, outside of line D, remainder 1 foot below low water.
"D".....	do.....	191	To be removed to a depth of 1 foot below low water.
"2".....	do.....	104	do 1 do
"3".....	do.....	94	do 1 do
"P".....	do.....	150	do 3 feet do
"M".....	Boulders....	150	do low water line.
		2,227	

Rocks L, A, B, C, D, 2, 3, P and M to be removed below Rock N, and deposited where water is not less than 30 feet in depth.

REPORT OF HON.^{RE} J. W. TRUTCH, ON DREDGING FRASER RIVER.

(Reference No. 10,720.)

VICTORIA, B.C., 28th December, 1880.

SIR,—I have the honor to forward, for your information, a copy of two letters to me of the 9th and 10th instants respectively, and of the enclosures therewith, from Mr. George Turner, reporting the close for the season of the work of dredging in Fraser River, which has been carried on under his direction since June last, and the results attained, which are more particularly shown in a chart accompanying his letter of the 9th instant, and further stating that the dredger, tow steamer and punt had been moored in the Coquitlam River on the 3rd instant, and all hands employed on the work duly paid off; but that on the 8th instant, in consequence of an extraordinary freshet and break up of the ice, these vessels broke away from their anchorage, and the steamer and two of the punts were carried out into the Fraser River and received some damage. The whole of these vessels are now, however, again moored in the Coquitlam River in a position which has hitherto been always considered the safest berth on the Fraser River during winter, and are left under the charge of a watchman who has been employed on previous occasions in a similar capacity.

The expenditure on this work under Mr. Turner's superintendence has amounted, as far as I can ascertain at present, to \$7,388.23, and adding the cost of fitting up and towing the dredger and punts to the Fraser River, viz.: \$1,600.07 (which sum was paid by direct remittance from the Department at Ottawa). The total expenditure on this service since your instructions were received that the dredger was to be despatched to the Fraser up to the present date, is \$8,938.35.

The only other payment to be made this year on this account, that I am aware of, is the sum of \$40 for wages of the watchman in charge of the vessels, so that I believe it will be found that the sum of \$9,000, to which your instructions to me limited the expenditure on this work, will not have been exceeded.

I consider that Mr. Turner's selection of the locality at which the dredger has been employed was as judicious as any that could have been made, and the work executed has been certainly, temporarily at least, beneficial, in as far as a new channel 13 feet in depth has been created, which reduces the distance to be traversed by steamers and other vessels of 10 feet draft and over from New Westminster to the mouth of the Fraser River by more than two (2) miles. It is very uncertain, however, in my judgment, what permanent results may ensue from the alteration thus effected in the course of the river.

This can only be ascertained after the summer freshet has been experienced under the new conditions created.

The main impediments to navigation from the Straits of Georgia to New Westminster consist in the tortuousness and shallowness of the channel through the sands at the mouth of the Fraser, and in the changes which it undergoes after each succeeding year's freshet.

The depth at low water in this channel through these sands is only ten (10) feet as at present reported, whilst there is more than that depth of water at all times in the channel of the river from its mouth to New Westminster. It seems of no real advantage to incur expenditure in still further increasing the depth of the river channel beyond that now existing in the channel between the mouth of the river and the sandheads, and I am, therefore, unable to recommend that any further outlay be made on this account.

I have the honour to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honourable

HECTOR L. LANGEVIN, C.B.,
Minister of Public Works, Ottawa.

NEW WESTMINSTER, 9th December, 1880.

SIR,—I have the honour to report that, in accordance with your instructions, the dredger, tug and punts have been moored in Coquitlam River, the engines dismantled, properly white leaded, &c., and everything made secure for the winter. The tug will require to be thoroughly overhauled and a sleeve put in before being able to resume work.

The dredger will also require some new castings for the upper reels of her ladders, and other general repairs.

I have herewith enclosed a plan of the bar on which the dredge has been working, giving the depth of water before commencing work in black figures, and the present depth in red, also a copy of the diary kept by the foreman in charge.

The length of line worked over by the dredger is two thousand (2,000) feet, and two hundred and fifty (250) feet in width, along which a channel has been cut from three (3) to seven (7) feet, giving a depth of water at the lowest tide of thirteen feet in the shallowest place and at ordinary high tide twenty-one (21) feet, which I am of opinion will be considerably deepened by the next summer freshet.

Forty-four thousand (44,000) yards of sand have been lifted by the dredger during the season's work, and one hundred and five thousand (105,000) yards moved from the bar by the action of the current and the working of the dredger combined.

I beg to suggest that the channel be marked out by two small buoys, one at the lower and the other at the upper end or about two thousand (2,000) feet apart. I have erected four beacons, two on the main river, and two on the slough; the two on the slough are very hard to see from the main river, owing to the distance, the nearest place they can be erected being one and a half ($1\frac{1}{2}$) miles from the main river with a back ground of timber; the ground is also very low and of fine sand, making it impossible to get a large stick deep enough in the ground to make it secure from the wash of the tide and drift timber.

I have the honour to be, Sir,

Your obedient servant,

GEORGE TURNER.

The Honourable J. W. TRUTCH,

Agent Dominion Government, Victoria, B.C.

APPENDIX No. 18.

REPORT OF THE COMMISSION

APPOINTED BY

ORDER IN COUNCIL DATED 6th NOVEMBER, 1871,

TO ENQUIRE INTO AND REPORT ON THE ALLEGED OBSTRUCTION
OF NAVIGABLE STREAMS AND RIVERS IN THE PROVINCES
OF QUÉBEC AND ONTARIO, BY DEALS, EDGINGS,
SAWDUST AND OTHER REFUSE FROM SAW
MILLS;" TOGETHER WITH THE ACT
36 VIC., CHAP. 65, ENTITLED

"An Act for the better protection of Navigable Streams and Rivers."

APPENDIX No. 18.

REPORT OF THE COMMISSIONERS APPOINTED TO ENQUIRE INTO THE
ALLEGED OBSTRUCTION OF NAVIGABLE STREAMS AND RIVERS
BY SAW-DUST, &c.

OTTAWA, February, 1873.

F. BRAUN, Esq.,

Secretary, Department of Public Works.

SIR,—In laying before the Honorable the Commissioner of Public Works for the Dominion this, our report upon the results of our examination and enquiries into the subject submitted to us in your letter of the 14th November, 1871, we consider it expedient, in the first place, to quote that letter in full :—

"SIR,—I have the honor to inform you that, by Order in Council, bearing date 6th November inst., with the view of carrying out the recommendation made by the Committee of Parliament on Banking and Commerce, you have been commissioned, conjointly with John Mather, of Chelsea, and R.W. Shepherd, of Montreal, Esquires, to enquire into and report on the alleged obstruction of navigable streams and rivers, in the Provinces of Quebec and Ontario, by deals, edgings, saw-dust, and other refuse from saw-mills.

"The Commission will please ascertain in time to allow the Minister of Public Works to have a report laid before Parliament at its next session, (11th April, 1872), whether the complaint made of navigable streams and rivers being so obstructed, are well founded; and what means should be adopted to prevent such obstruction in future, keeping in view the legitimate interests of mill-owners and manufacturers.

"I have the honor to be, Sir,

"Your obedient servant,

"F. BRAUN,

"Secretary.

"Honorable H. H. Killaly,

"Toronto."

In reply to this communication, "the gentlemen named expressed their willingness to undertake the performance of the duties involved in the Commission; and Mr. Killaly (elected Chairman of it) added, that all possible diligence would be used so that the report should be made *as soon as practicable* which, however, in a great measure, must unavoidably be governed by the nature of the weather. He also suggested that time might be saved by the Commissioners being furnished with a copy of the complaints given in evidence before the Parliamentary Committee."

On the 11th January, 1872, the Chairman received the following telegraph from the Department :—

HON. H. KILLALY,

"Please state whether your Commission has commenced enquiry, and, if possible, when report may be expected.

"F. BRAUN."

The answer to this was, that the nature of the matter, and the frozen state of the rivers, had, up to that date, utterly precluded the possibility of our making any examination of them; but that we had been in communication with several parties in Canada and elsewhere upon the subject, from whom we trusted to receive information of value, and which would facilitate us in the discharge of our duties.

From the importance of the subject and the magnitude of the two great interests, (the lumbering and the navigation), specially involved in it, and which seemed to be in some measure antagonistic, we felt fully convinced that mere enquiries on our part could not enable us to make a report that would be entitled to much weight; and that to lay the matter so fully before the Minister, as would enable him to meet the requirements of the Committee of Parliament, a thorough and personal examination of all the important points on the principal rivers was absolutely indispensable; and that such an examination should be attended by a close comparison of the relative heights of the rivers at different times, in reference to extreme low water, as well also by numerous borings, with suitable instruments, by which specimens of the material forming the beds of the rivers, taken from many places and at various depths, could be brought up. It was obvious that such inspections and trials should be made at different stages of the rivers.—First, immediately after high-water, upon the “break up,” in order to determine whether, as is alleged by some, all the saw-mill refuse, thrown in the preceding summer, is annually carried off by the floods or not—a similar examination is equally as essential in summer low water, in order to ascertain the nature and extent of the bars (if any) represented to have been made, to the serious detriment of the navigation. Again, shortly before the setting in of winter, when the mills had ceased to work, it is highly desirable to find where the great mass of waste, discharged into the river during the whole of the preceding summer, had lodged;—this point being fully established, a final examination in the succeeding spring would settle the question, beyond all doubt, as to *whether obstructions to the navigation are, or are not, created by the throwing of the waste from the saw-mills into the river.*

During the portions of the past year whilst the frozen state of the river rendered a practicable inspection of them impossible, we were not remiss in seeking to collect information from several persons in the adjoining States, and the Dominion, whose acquirements and pursuits, we conceived, justly entitled their opinions to careful and unbiassed consideration. In doing this, we have, at the same time, spared no pains to satisfy ourselves, by *personal examinations* and close observation of the facts so far as it was possible for us to do in the course of one season.

Our first step, before going upon our inspection, was to send to each member of Parliament of the Provinces of Quebec and Ontario, and also to other parties whom we considered informed or interested in the subject of the enquiry, a copy of the following circular:—

“OTTAWA, June 8th, 1872.

“To ——— M.P.

“SIR,— The undersigned, who have been appointed by the Government, Commissioners to inquire into and report as to the effects produced by the discharge into the navigable streams and rivers of the Provinces of Ontario and Quebec, (*as regards the navigation thereof*) of the waste from saw-mills, saw-dust, slabs, edgings, &c., take the liberty of requesting you will be so good as to suggest to them, through their Chairman, the names and localities of any such rivers and streams in your county to which you may consider their attention should be directed.

“Yours respectfully,

“HAMILTON H. KILLALY, Chairman, Toronto,

“R. W. SHEPHERD Montreal,

“JOHN MATHER, Chelsea.”

To these circulars we received replies from the following gentlemen, viz :—

T. J. Robitaille, Esq., M.P.,	County of Bonaventure,
Charles Clarke,	Wellington,
George McManus,	Cardwell,
John J. Grange,	Lanark,
George Kempt,	Victoria, N.B.,
J. C. Wood,	Victoria, S.R.,
H. Finlayson,	Brant,
S. McCall,	South Norfolk,
J. S. Smith,	North Middlesex,
Samuel Ault,	Stormont,
Thomas Gibson,	Huron, N.R.,
Hon. A. McKellar,	Bothwell,
William Barber,	Halton,
M. P. Ryan,	Montreal City,
Thomas Street,	Welland,
McKenzie Bowell,	Hastings,
Louis Sylvester,	Berthier,
R. J. Cartwright,	Lennox,
A. Oliver,	Oxford.

We commenced our inspections with the River St. Maurice. On our arrival at Three Rivers, we called upon Mr. McDougall, M.P. for the town. He introduced us to Mr. Gérin, M.P., and to Mr. Godin, M.P. To all those gentlemen, and to Mr. Symmes, Superintendent of the River Works, we are much indebted for the information they afforded us, and also to the Messrs. Baptist, who kindly placed their steamers at our disposal, thereby much facilitating our examination of the river. We were accompanied on our inspection by Messrs. McDougall, Gérin, Godin and Symmes, and by several of the leading inhabitants of the town. Mr. McDougall informed us that he and his brother are the proprietors of the "Forges," about six miles up from the mouth of the river; that they are deeply interested in the maintenance of the navigation, inasmuch as they carry the greater part of their supplies and iron upon it in bateaux. They have never suffered any inconvenience from the saw-dust, slabs, edgings, etc., which are all thrown into the river at the saw-mills of the Messrs. Baptist, situated at the head of the Grais Rapids, about nine miles above the "Forges." From the head of the Grais to the Shawenigan Rapids, about eleven miles, the river is unfitted for navigation by a series of strong currents and rapids. The amount of lumber annually made at this mill is about ten millions of feet; as already stated, all the waste from this mill is thrown into the river. Almost the entire of the slabs and edgings are, in the first instance, caught by the rough rocky bottom of the rapids, which extend some distance down the river, but above the navigable portion of it. They there accumulate, and form "jams," which, however, never remain for any length of time, being carried away by each succeeding freshet. A portion of the saw dust is deposited upon the shores of the river, all along down to its junction with the St. Lawrence, but none in the channel to the detriment of the navigation. The chief part of it is carried into the St. Lawrence, and no more heard of. The floating slabs and edgings, etc., when freed from the "jams" in which they had been at first detained, are eagerly collected and carried off for fuel by the poorer people, many of whom we observed so occupied.

The opinion given us by Mr. Symmes fully confirmed Mr. McDougall's statements, and were further corroborated by our own soundings and observations. We closely examined several parties residing in the vicinity—the uniform answer from each was, that he never had heard of, or known, any complaint made of obstructions to the navigation from saw-dust deposits.

We next proceeded to examine that part of the river from the bridge to the St. Lawrence, a distance of about $1\frac{1}{2}$ mile, taking the opportunity of inspecting the very

extensive and fine new saw-mill on the west side of the St. Maurice the property of the Messrs. Stoddart and Company. The gentlemen we found in charge freely gave us all the information we asked for.

The lumber annually made at this mill is about twenty millions of feet.

The small portion of saw-dust not consumed in the furnace, is all carted to form and level the piling ground. The whole of the slabs, edgings, sidings, battings, etc., is converted into fence pickets, sash and other stuff, and fuel wood : this latter item, alone, contributing to the Company from twenty to thirty dollars daily, thus conclusively proving that it is perfectly practicable, economical, and to the true interest of the proprietors of all such concerns to utilize every portion of their timber ; the people in the vicinity are, at the same time greatly benefitted, by being enabled to procure, for the trifling sum of about fifteen cents, a full cartload of firewood.

At the mouth, or, rather, the mouths, of this river, for by islands near the St. Lawrence it is divided into three branches, (hence the name *Three Rivers*.) there are very extensive shoals, obviously formed of the vast quantity of detritus (chiefly fine sand) brought down annually, and deposited in the eddies, which may be said to extend wholly across the entire river. These eddies are caused by what may be termed the struggle of the waters of the St. Maurice with those of the St. Lawrence, where they meet ; the strength, position, and direction of these eddies are very much influenced by the constantly occurring variations in the levels of the waters of both rivers, the periods of which do not coincide. They are also much affected by the high winds which occasionally are felt there in great violence. The inevitable consequence of all this is repeated and sudden changes in the position and character of the bars and channels. A navigable channel, which had been on the west side of the river in one year, for some months, will be found in a short time closed up perfectly, and in its place a bank of sand ; a channel in a totally different place being cut at the same time. Such changes, to a greater or less degree, are constantly occurring.

On our inspection of Messrs. Stoddart's mill, complaints were made that they were much troubled by bars formed about their boom, which they attributed to the slabs and saw-dust thrown into the river above being collected and deposited there. We took particular pains to investigate the matter.

We found that in order to collect and retain their logs, a very long boom had been constructed, extending from their mill to a pier above the bridge, sunk for the purpose. This boom is, on an average, about 150 yards from the bank, and parallel to it, or nearly so. The direction of the boom is maintained by a series of piers sunk at certain distances apart, and rather overlapping each other. They are met by the current somewhat obliquely. We observed down stream of each of those piers, a considerable bank of sand was formed. The space between them and the shore was thereby rendered nearly slack water, and the current all but stopped by the mass of logs lying on the bottom of the pond, which is, therefore, rapidly filling up, and must continue to do so. The banks of the river are high and perpendicular, and consist of fine sand. In any, even in very moderate winds, great quantities of this sand are blown into and remain in the dead water within the boom.

On examining the bars very carefully, and in several places, we could detect but a very minute portion of woody matter, and we came to the conclusion that the piers are the chief cause of what the Messrs. Stoddart complain. Some few years ago a deep channel lay nearly in the line of the boom, where at present a saw-log can scarcely float, owing, in our opinion, to the effect of the piers upon the current.

On the island in the east channel are two fine steam saw-mills, owned by Messrs. Baptist, at which some ten millions feet of lumber are annually produced.

Before leaving Three Rivers, being not far from the Rivers Batiscan, Bécancour and St. Anne-en-bas, we thought it desirable to extend our enquiries to them, although not referred to in any one of the answers to our circular.

THE BATISCAN.

Batteaux, capable of carrying from eighty to one hundred cords of firewood, ply in this river as far as St. Geneviève, which is about eleven miles from its mouth.

Mr. Price is the owner of a saw-mill upon this river, situate about five miles higher up it. The produce of this mill is set down at about eight to ten millions of feet annually. The lumber is carried down from the mill by means of a long shoot, or "*dahl*," of three miles in length. It is then loaded at a wharf into barges and sent off.

This mill is worked by water, and the waste from it is discharged into the river. It is detained at first in the long rapids, but is carried off by the next floods. No complaints are or have been made of any inconvenience or impediment to the navigation.

THE BÉCANCOUR AND THE ST. ANNE-EN-BAS.

From the information we received as to these rivers, we did not consider that the object of our Commission required our visiting them; we accordingly proceeded thence to Ottawa, to examine that most important river, whether as regards its magnitude or the importance of its navigation, which it is contemplated to extend so as to make it a thorough and uninterrupted water communication, connecting Lakes Huron, Michigan and Superior with the cities of Ottawa, Montreal and Quebec.

There being, naturally, very conflicting opinions entertained and expressed upon the subject of our enquiry, this seems to us a very fitting place to state the order in which we propose to treat it, so that both sides of the question may be impartially considered.

1st. To give a *resumé* (see page 6) of the allegations in the petition (see Appendix No. 1) presented to the House of Commons, against the Bill intituled "An Act for the better protection of Navigable Rivers and Streams," signed by Messrs. Gilmour & Co., and seventeen others.

2nd. Of the opinions and views, expressed in their respective reports and affidavits laid before us, of all those (many of them gentlemen of high standing) who believe that no injury accrues, or is likely to accrue, to navigation by the discharge into the rivers of all the saw-dust produced by the mills on the Ottawa and its tributaries. (See Appendix 2 to 23, both inclusive.)

3rd. Of the opinions and views of parties, of equal authority, with which we have been furnished, who contend that such disposal of saw-dust is prejudicial to navigation. (See Appendix Nos. 24 and 25.)

4th. To show how far those conflicting statements and opinions are corroborated, or otherwise, by our own trials and observations.

After doing this, having already stated the results of our enquiry upon the Bécancour, Batiscan and St. Anne-en-bas, we shall proceed with a statement of the examinations and observations we have ourselves made upon the condition of the

Shannonville River.
Napanee "
Moirs "
Lower Trent "

Bobcaygeon River.
Fenelon Falls "
Seugog "
Muskoka "

Finally, we shall conclude our report by explaining the means we recommend to be at once adopted by legislative enactments for the protection of the navigable streams and rivers within the Provinces of Ontario and Quebec, as being, in our opinion, the most expedient under all the circumstances, in the interests of these two great sources of Canadian industry, the lumbering, and the navigation. In November, 1871, a Bill, intituled "An Act for the better protection of Navigable Streams and Rivers," was introduced into the House of Commons by Richard J. Cartwright, Esq., M.P. for the County of — — —. After the preamble the following enactments were contained:—

Section 1. That from and after the first day of July, 1872, no owner, tenant, etc., etc., of any saw-mill shall throw, or cause to be thrown, or permit to be thrown, any saw-dust, edgings, or rubbish of any description into any navigable stream or river,

either above or below the point at which such river or stream ceases to be navigable.

Section 2 declared the penalty for violating the preceding section; for the first offence, a fine of not less than twenty dollars, and for the second and each subsequent offence a fine of not less than fifty dollars for each offence, and by this section also was declared the manner in which the fines were to be summarily recovered.

The third section made it the duty of the several fishery officers to examine and report upon the state of the navigable streams and rivers, and to prosecute all parties contravening the terms of this Act.

By the fourth section it was provided that in cases where it was clearly shown, to the satisfaction of the Minister of Marine and Fisheries, that no injury is accruing or likely to accrue to the navigation of any stream or river, he might, by proclamation in the official *Gazette*, exempt from the operations of the Act the whole or any part of such stream or river lying above the point where it ceases to be navigable.

The introduction of this Bill was immediately followed by a strong petition to the House of Commons, (see Appendix No. 1), signed by Gilmour & Co. and seventeen others, chiefly connected with the mills upon the Ottawa and its tributaries. In accordance with the arrangement which we laid down for making our report, (as explained on page 6), we now proceed to give a *résumé* of the allegations in the petition, viz:—

That petitioners represent a very large capital, invested at the Chaudière and elsewhere on the Ottawa and its tributaries; employing at least 8,000 men, and 3,000 teams; producing a very large addition to the exports of Canada, amounting to four hundred millions feet of lumber, and four millions of dollars of value annually.

That the proposed legislation with regard to the navigable streams and rivers will most injuriously affect those interests, as it is *impossible to prevent saw-dust*, from mills driven by water, falling into the water; and consequently the enforcement of the Bill would compel them to close their mills, and to remove to other localities where steam power can be used.

That they fully recognize the importance of maintaining the navigation of the Ottawa River, but that they are in a position to prove, as well from the result of actual investigation of the River Ottawa as from the experience of similar operations, of fifty years past, on the Hudson and Penobscot Rivers, that *navigation is not injured* by the falling into them of *saw-dust*, which is yearly carried off by the spring freshets.

That the petitioners therefore prayed the subject might be fully investigated, and opportunity be afforded them to submit scientific and practical evidence in support of the allegations of the petition.

Upon consideration of the Bill, and the arguments and evidence adduced *pro* and *con*, and opportunity afforded to gentlemen to appear and address the Committee in opposition to it, it was moved by the Hon. M. Cameron, member for the County of Peel, "That the Committee are not in possession of sufficient information to pass the Bill now before the Committee, and that they report to the House, that by commission or otherwise, as the Government may determine, information be obtained on the subject, to be laid before the House at a future period." This motion was carried, and the following report (in substance) was made to the House by the Select Standing Committee on Banking and Commerce, signed, Alexander Morris, Chairman *pro tem*:—

"That the Committee had considered the Bill, the object of which is to put an end to the practice of throwing saw-dust, edgings and other mill rubbish into navigable rivers, tending (as assumed by the Bill) to obstruct the navigation; that upon this point the Committee are entirely without evidence, and, as it is a matter of serious importance, they report the Bill back to your honorable House, and beg to recommend this subject to the consideration of the Government, with a view to an enquiry by a commission or otherwise." Signed, Alex. Morris, Chairman *pro tem*.

During the discussion upon the Bill, Mr. Bronson, a proprietor of extensive mills at the Chaudière, appeared before, and addressed the Committee in corroboration of the allegations in the petition, and in opposition to the Bill.

This gentleman had spared no trouble or expense in procuring reports from undoubtedly eminent professional men, in support of the views of the petitioners, and also a large number of affidavits from various parties connected, more or less, with the milling interests on the Hudson above Troy, and with the navigation of that river and of the Champlain and Troy Canals.

We follow the arrangement adopted by us (see page 6) in here giving a *résumé* of the substance of these several reports and affidavits, which are to be found in the Appendix 2 to 23, both inclusive.

In all of them, the most decided opinions and statements, affirmed under oath, will be found, that *saw-dust is not to be traced in combination with sand* in the bars created from time to time in those rivers and canals, and further, that in no case has the throwing of saw-dust been found to be injurious to the navigation.

The first of the papers in the above list, (see Appendix No. 2), is a report, the date not given, made to Mr. Bronson, by Professor Greene, treating the subject in a purely engineering point of view. He puts the questions:—

1st. What are the causes which induce the formation of bars in navigable or other rivers?

2nd. What materials usually compose such bars?

3rd. What are the specific gravities of these materials?

4th. What velocities of current are necessary to take up and transport these materials to the point of final deposit? After these, a fifth is indirectly added—What is the specific gravity of pine saw-dust, and the velocity of current necessary to take it up and transport it?

To these questions, clearly and logically put, Mr. Green gives, in their succession, indisputable answers, so far as his theoretic calculations and experiments extend. The entire report, which is very voluminous, exhibits great research, and intimate acquaintance with the best scientific authorities, both native and foreign, upon the subject on which he writes. This report is concluded thus:—

“In view of my experimental results, together with the facts observed by the “U. S. Engineers upon the Hudson River, and in view of the experience of lumber-men and navigators upon the Hudson and Penobscot Rivers, I have formed the “following opinions, viz.:—

“That saturated pine saw-dust will not be permanently deposited in water where the “velocity of the current exceeds 0.25 of a foot per second, or one-sixth of a mile “per hour.

“That water-logged chips may be deposited when the velocity of the current is less “than 1.00 feet per second, or two-thirds of a mile per hour.

“That saw-dust may accumulate in eddies and in still water, or where the velocity of “the current is permanently less than 0.20 to 0.25 of a foot per second.

“That bars of saw-dust and sand combined will not be formed under any circumstances, “for the reason that when the velocity of the current is diminished so as to permit “the deposit of sand, it is still more than twice as great as is necessary to hold and “transport saturated saw-dust; and hence,

“That saw-dust will not accumulate or be permanently deposited in rivers where sand “bars occur, unless there exist expansions of the river below such sand bars, “sufficient to make a cross section, more than double that at the side of the bar.

“That if in low water saw-dust should accumulate in small quantities, *the accelerated “current of the first freshet would take it up and sweep it down stream*; and finally,

“That, as it is extremely improbable that the minimum freshet velocity in the Ottawa “River ever falls below 0.25 of a foot per second, there is no reason to anticipate “the formation of permanent or troublesome bars, or accumulation of saw-dust “in that river.

"This opinion may be modified or strengthened when more definite and precise information shall have been obtained in relation to the magnitude of the Ottawa River, its water-shed and other characteristics.

"I am, &c,

"D. M. GREENE,

"Civil Engineer.

"H. F. BRONSON, Esq.,

"Ottawa, Canada."

His reference to the *Penobscot River* is short. "That sworn statements have been obtained of persons who have been engaged upon, and are acquainted with the *Penobscot River*, in the State of Maine, which runs through a pine timber region, upon which very extensive lumbering operations have been conducted for many years, and into the waters of which vast quantities of saw-dust and edgings are and have been cast. These statements show that accumulations of *saw-dust alone* in the channel of that river, have never been known, and that no injury, impediment or obstruction to its navigation has ever resulted from casting the *saw-dust* into it."

Professor Greene's second report, (see Appendix No. 3), also made to Mr. Bronson, is dated 10th March, 1871. He states in the commencement of it, "that since his arrival in Ottawa he had been put in possession of such information in regard to the magnitude, character and habits of the *Ottawa River*, as would enable him to form a more definite and decided opinion as to the possible effect upon navigation which may be produced by casting the *saw-dust* into the river at this point."

That the information furnished him by A. J. Russell, Esq., of the Crown Lands Department, showed, "that the extent of territory drained by the *Ottawa* and its tributaries, above the City of *Ottawa*, is 43,000 square miles;—that between the City of *Ottawa* and *Grenville*, is 19,000 square miles;—and that 4,000 square miles are drained below *Grenville*;—the extent of territory drained by the *Ottawa*, and its tributaries above the City of *Ottawa*, is 43,000 square miles; above *Grenville*, 62,000 square miles; above *Montreal*, 66,000 square miles."

Nearly the whole of this second report is taken up with calculations of the velocity of the water at various points, between the City of *Ottawa* and the foot of the Lake of the Two Mountains, and they are principally based by Mr. Greene upon the breadth of the river and lakes, and the soundings *shewn upon the maps* respectively prepared under the directions of Mr. Shanly and of Mr. T. C. Clarke, civil engineers, to accompany their reports upon the proposed improvements of the navigation of the *Ottawa*.

In concluding this, his second report, Mr. Greene says: "Samples of material, six in number, taken from the shoal places in the *Ottawa* between the City of *Ottawa* and *Grenville*, have been *shewn me*. These materials are wholly composed of *pure, clean sand*, of different degrees of fineness; not the *slightest indication* of the presence of *saw-dust* can be detected in any of the samples, even when examined under a glass."

"As the result of this further investigation, together with the examination which I have made of the materials taken (shown to him) from the shoals on the *Ottawa River*, the opinions which I have expressed in my former communication are not only confirmed, but are very materially strengthened, and I now feel no hesitation in expressing the opinion:—

"That *saw-dust* obstructions have not thus far been formed in the channel of the *Ottawa River*, and

"That there is no reason to apprehend the formation of such obstructions in the future."

Having in the above closed our *résumé* of the opinions of Professor Greene, as stated in his two reports (see Appendix 2 and 3), we proceed to give a similar one of the opinions of Mr. McAlpine, as shewn in an affidavit (see Appendix No. 4) made by him, before E. M. Wood, Esq., a Commissioner of the Circuit Court of the Commonwealth of Massachusetts, dated Feb. 16, 1871.

In this affidavit Mr. McAlpine deposes that he has had charge of the enlargement of the Glen's Fall Feeder, and the reconstruction of its locks, and also of the Champlain Canal, and (during his term of office) of the removal of the Castleton bar, in the Hudson River, about six miles below Albany.

That he has had to pass over the Champlain Canal and the feeder frequently during the time the workmen were removing the deposits from the bottom of these canals, the character of which deposits he has accurately noticed.

That he has never seen or heard of any accumulation of saw-dust in any part of the channels of these canals, or of any obstruction from such to the navigation of the Hudson River above Glen's Falls, nor below Fort Edward, (the river between these two places being an almost continuous rapid).

That during the removal of the Castleton bar, he frequently examined the material excavated, and never observed any deposits of sawdust, but has seen sunken logs and decayed wood.

That the sand used for the masonry of sundry public works, was, by his directions, taken from the Hudson River bars, in consequence of its entire purity and freedom from woody matter.

That he has also had occasion to examine the deposits made upon many other rivers of the United States, where large lumbering operations were carried on, as on the Delaware, Susquehanna, and some in the Western States.

That he has never seen or heard of any obstructions to navigation, caused by the deposition of saw-dust.

That from the inferior weight of long water-saturated sawdust, to that of even the finest sand, the former will always be moved forward by a current which just begins to deposit the latter, and hence, that the two would rarely be deposited in the same place.

That saw-dust will never be deposited where there is a current of more than one fifth of a mile an hour, and only where there is almost no current, as in eddies, &c. and even if it should occur in any navigable channel, it would of itself form almost no obstruction.

The next document upon the list, a report (per Appendix No. 5) from the Honorable W. J. McAlpine, made also to Mr. Bronson, dated Albany, March 1st, 1871, commenced by stating:—

That the subject under discussion, namely, the effect upon the navigation of the Ottawa River by discharge of sawdust into it, had been carefully discussed by him and Mr. Greene, and

That together with his own, he sends the report made by that gentleman, dated 10th March, 1871, in which he fully concurs. (See Appendix No. 2.)

"That there being no engineering authority giving the specific gravity of saturated saw-dust, or the velocity of current required to remove it, Mr. Greene had to resort to direct experiments, to determine these two points, necessary to the solution of the question involved. The results of his experiments are, that the specific gravity of water-saturated sawdust, or of its weight compared with water, is 1.05. The velocity necessary to remove coarse saturated white pine saw-dust, lying on a smooth bottom of a stream is 0.282 feet per second, equal to about one-fifth of a mile per hour, and of fine saw-dust, is 0.245 feet per second, or about four-sixths of a mile an hour."

Here follow, nearly verbatim, the statements to be found in Professor Greene's report, and it appears therefore unnecessary to quote further in continuation from that of Mr. McAlpine. Towards the conclusion of his report Mr. McAlpine states that he has based his opinion "upon his observations of the upper and lower Hudson Rivers, not having examined the Ottawa"; and further,

"That a considerable portion of the saw-dust thrown into the stream will doubtless accumulate in the side bays of still water, and sometimes, perhaps, temporarily in parts of the channel where previous obstructions have been produced by logs, brush, stumps, sand, &c., but in these cases it will be removed by the first fresher."

Mr. McAlpine concludes by reiterating what he had previously stated, that "he never had observed or heard of obstructions to navigation from the deposit of saw-dust."

We have given in the foregoing a just compendium or analysis of the statements and opinions upon all the essential points involved in our inquiry that are to be found, 1st, in the petition presented against the proposed Bill, and 2nd, in the two reports made by Professor Greene, and in the one made by Mr. McAlpine to Mr. Bronson, as well as in the affidavit made by Mr. McAlpine upon the subject. These four documents, together with eighteen other affidavits, were handed to us by Mr. Bronson for our consideration in special reference to the Ottawa. To these latter eighteen affidavits we think it unnecessary further to advert, than to state that several of them are made by gentlemen of high standing, and all by respectable parties, more or less connected practically with the lumbering and navigation on the *Hudson River*, and the *Champlain* and *Troy Canals*—also, that the substances of them all go to substantiate the views and opinions given by Messrs. Greene and McAlpine. All of these documents were submitted in evidence to the Committee. (See Appendix Nos. 5 to 22, both inclusive.)

The next step we have now to take is that described under head No. 3 (see page 6), namely, to give a *resumé* of the opinions and views of parties of equally high standing and attainments, who maintain that the *discharge of saw-dust into rivers is injurious to navigation*, and should be prohibited.

On referring to Appendix Nos. 24 and 25, will be found two such communications, one from General Thom, Brigadier General in the United States Artillery, who was selected, a short time since, by his Government, to make an investigation of very much the same character as that involved in the commission entrusted to us.

The other is from the Hon. Mr. Muirhead, of Miramichi, New Brunswick, a proprietor of extensive saw-mills and wharves on that river.

It may be well here to observe, that the small number of documents affirming that navigation is injuriously affected by saw-dust, contrasted with the number of those to the contrary, we believe is owing to the fact that much pains were taken to seek for and procure reports, affidavits, &c., in support of the latter, while no exertion whatever appears to have been made on the opposite side; had this been otherwise, it is questionable whether at least an equal number of opposing affidavits would not have been forthcoming. From General Thom's communication (Appendix No. 24), it will be found the opinions he has formed as the results of his examinations of several rivers (in all cases tidal rivers, like the Hudson), are—

"That waste, slabs, edgings and saw-dust have been accumulating for the last forty years and more, to such an extent as to have *greatly impaired the navigation of these rivers*."

"That this waste, in being thrown into the rivers, is carried up and down by the tidal currents, until, becoming heavily water-soaked, it sinks in *slack water* or *eddies*, and forms *constantly increasing obstructions to navigation*. In all the rivers in the State of Maine, these obstructions, if formed of slabs and edgings, do not extend more than four miles below the head of tide water, as in the Penobscot River, and in the smaller rivers not more than one mile below it, whilst the *saw-dust* is, for the most part, carried by the current several miles further down, and deposited in the *slack water* and eddies of the bends and bays, there *forming extensive shoals*, shifting in their character, and *having narrow and crooked channels*."

"That, in the Penobscot River, these slabs and edgings have accumulated to a depth, in some places, of not less than eighteen feet, with an average depth of about ten feet, over an area of not less than two hundred and seventy-five acres, the solid contents of which are more than four millions of cubic yards."

"That it is but recently that these facts have attracted the public attention to such a degree as to have proved the necessity for the prevention in future, by *statute*, of the throwing in of slabs or edgings; but *not*, it is much to be regretted, *that of saw-dust also*."

"It is, *however, believed, that this will be prevented* at an early day; so great is the damage caused by it, that, during the past two or three years, he has been very successful in the removal of these obstructions, by means of dredging machines provided with buckets of a peculiar description, in which work, the difficulty consists not so much in the excavation of the material, as in *disposing of it afterwards*; and to give an idea of the cost of removing the material, he states,

"That he has had a proposal, within the last ten days, made to him to excavate and remove about twenty-five thousand cubic yards, at *seventy-five cents per cubic yard*, by contract, which proposal he will probably accept." For General Thom's communication in full, see Appendix No. 24. Upon this same side of the question, the Hon. Wm. Muirhead, of Miramichi, N. B., in substance states:—

"That there are a number of saw-mills, some driven by steam, some by water, on the Miramichi River.

"That some of the *steam mills* have been in the habit, for years, of depositing and still continue to deposit, a greater part of the saw-dust made by them in the river, as well as bark, slabs, and edgings, *most of which* do not go far from where they are deposited, till they sink and remain there, which has been proved by the depth of water in the harbours of the rivers; especially about the wharves, where it is more perceptible.

"That fifteen to twenty years ago, at any of the wharves there was twenty feet of water, but now there is not more than 10 to 12 feet, causing wharf owner to extend their wharves nearer to the channel.

"That the material that composes the filling up is *saw-dust slabs*, and edgings and other refuse matter, deposited from mills, mixed with a small portion of mud.

"That all the water-mills on the main river, as well as on its branches, deposit the most of their refuse matter in the streams, which has had the effect of *filling up* all small harbours, curves and creeks on the river, which is easily perceived by comparing them with what they were like a few years ago.

"That at one time the bed of the river, or at least along the shores and creeks was composed of sand and gravel, but now is *chiefly refuse matter* from saw-dust.

(Mr. Muirhead then proceeds to state the great destruction of the fish, caused by these deposits; of this, similar complaints were made to us upon our inspection of other rivers, but as this subject is not embraced within our commission we do not feel called upon to take any further notice of it.)

"That at some mills slabs and edgings are rafted, under pretence of being taken away for fire-wood, but at night are set adrift, and lodge along the wharves and shores. A greater part of them are of pine and sink almost immediately after being put into the water. That the same custom exists all through the Province, but to a greater extent in the northern portion.

"That he strongly recommends the Government to take this matter into their careful consideration, and devise some means of preventing the depositing of *mill refuse* in our rivers. If not attended to in time it will destroy our fisheries altogether, as well as interfere *seriously* with the navigation of our rivers.

"That the penalty for depositing any mill refuse in the streams should be punishable by imprisonment of the owner of the mill, or the persons in charge of the same, as there is no use in putting on a small fine, as they would sooner run the risk of being fined than be imprisoned."

The above closes our *resumé* of all the statements, arguments, and opinions, *pro and con*, with which we have been furnished.

We now come to report our own examinations and observations made during our inspection of the Ottawa, comparing, as we go on, the results and the conclusions we have formed from them, and shewing where they corroborate or conflict with the various opinions contained in the foregoing.

From Lachine to the foot of the Carillon Rapids we proceeded up the Ottawa in the steamer *Prince of Wales*. From the head of the Grenville Rapids we were conveyed up the river in the steamer *Queen Victoria*. On nearing such wharves as we stopped at we found a good deal of saw-dust disturbed by the wheels.

From the very extensive saw mills at Hawkesbury it may be said that nearly the whole of the bark, slabs, edgings, sawdust, etc., is discharged into the river; this waste, together with what is brought down from the other mills above Grenville, is soon caught in the rough, rocky-bottomed rapids below, and form, in sundry parts of them, large jams, which the succeeding freshet or flood carries away. On coming up the river, we observed large quantities of it strewn along the south shore, below the rapids, and saw very little floating saw-dust.

In the large bays and eddies above these rapids are very extensive shoals, standing over the surface of the water at the time we passed; from the distance we were at they appeared to be composed of pure sand; we did not examine them, however, as their position is out of the line of channel, and we were anxious to get to the portions of the river where the chief obstructions were alleged to exist.

From Grenville to Ottawa we did not meet with any obstruction whatever. On nearing the city we saw saw-dust floating, but not in large quantities.

On arriving in Ottawa, in order to facilitate us in our examination, we engaged the services of the steamer *Fairy*, which we found well adapted to our purpose, and the intimate acquaintance with the river possessed by Captain Nichols, who accompanied us, enabled him to bring us to the several points where it was expected we could find obstructions in the channel.

We found the bay at the entrance to the Rideau Canal to be so fully obstructed and blocked up with logs, square timber, etc., that it was with very much difficulty and by pushing aside the booms and logs, that we could get to the lock. We lost so much time in accomplishing this that we had to postpone making our soundings and borings.

Early the following morning we steamed down to McKay's Bay. Here we found an enormous mass of saw-dust accumulated, where, previous to it, there had been 40 feet of water. This pile was several feet over the surface of the river when we examined it. The end of a bar of sawdust, which runs out from the main mass down stream, lies from 40 to 50 yards within a line drawn from the upper to the lower points of the bay, and is consequently out of the direct course vessels take when going up or down the river. This bank or island of sawdust goes down deep pretty rapidly towards the river, to the shore it gradually shoals in, and at present the beach there, that had been a convenient place for repairing vessels, booming lumber, etc., is now rendered useless. This great mass has been for several years accumulating, but in a greatly increased ratio within the last four or five years, during which same period the production of saw-dust at the Chaudière has been almost three-fold. The extreme height of flood over low summer water at the site of this mass has been as much as twenty-two feet. Notwithstanding the greatly increased pressure by which it is hereby operated on, as well as its being subjected, more or less, to the influence of the torrent of water then pouring over the Chaudière, so short a distance above it, the holding of its position, undisturbed by such great forces, is a *convincing proof of the tenacity with which sawdust will keep its place after being some time deposited.* Further proof of which may be found also at the mouths of several of the rivers below Quebec, where considerable deposits of saw-dust, carried down from the mills above, remain in a *slimy state on the beach to this day, undisturbed by the roughness of the water in storms, or by the rapid current of the tides daily.*

We next proceeded to the bar near the mouth of the Gatineau; upon this we found from 9 to 10 feet of water; took various soundings, and made numerous borings with our boring irons, having a scoop at the end of them to bring up specimens of the bottom. Found this material to consist of very fine sand, which we consider is debris of Laurentine formation, and had been brought down the Gatineau from a great distance above the Ottawa. This sand, when examined by us *immediately after being taken up*, seemed to contain a very trifling admixture of woody matter; but in *these specimens*, which we preserved, dried, and subsequently closely examined, we found the proportion of the woody matter or saw-dust to be much greater than we could detect at first.

We then steamed down to the end of Kettle Island, and anchored at the head of George's Island for the purpose of examining the immense bank of deposit on the south side of the river, and from 2 to 3 feet over water at the level it then stood at. We found it very difficult to get the boring iron down; we also endeavored to dig pits in several places, but from the nature of the sand we could not sink beyond 3 feet at most.

The surface of this bank is streaked all over with little seams made by the ripple of the waters. These seams are for the most part filled with saw-dust. Over the whole surface of the bank chips and other waste is scattered, which, if the next freshet comes down rapidly, will be all carried off, but if quietly, more sand will be deposited over it, as is the case at Petite Blanche. In sinking these pits we found at about one foot under the surface some chips lying in a dark deposit of muddy silt, which, no doubt, had been the surface of the bank at a previous period.

We perceived, here and there, large roots of trees and some saturated logs embedded in the sand, in some places partly over the surface. This sand also is composed, as we found it elsewhere, of debris of Laurentine formation. From the north shore across the river to this great bank of sand the water was too deep to permit of the use of the boring rods, from 20 to 22 feet in length.

Steamed further down to the mouth of the Petite Blanche; anchored here also, about 12 miles below the city of Ottawa.

A very considerable bank has accumulated here; on examination the surface of the bottom appeared to be pure sand, but on testing it with the boring iron in several places, *we found a considerable quantity of saw-dust mixed with the sand*; in one place we discovered, about 2 feet down, a regular *stratum of saw-dust, over which* was deposited pure sand; at 3 feet down, we found but a very trifling amount of saw-dust, and at 4 feet none.

From the case of the alternate layers of saw-dust and sand adverted to, we concluded that, although fresh *saw-dust* and sand cannot come down *at once mixed together* as Messrs. Greene and McAlpine justly reason, still that such mixed deposits can and do take place. A light freshet may bring down saw-dust and deposit it, a subsequent one of more strength will bring down sand; as Professor Greene states it would do *lays it down upon top of the saw-dust*, and so on successively. The saw-dust, from its constantly increasing specific gravity and sliminess, will, on the occurrence of heavy freshets be mixed up with the sand, but will not be carried off, as is proved in this case beyond doubt.

We now moved down to the mouth of the River du Lièvre; there sounded along the navigable channel west side,—the water about 9 feet deep, a clear bottom, principally of coarse gravel,—in the channel east of the island, about the same depth, the boring iron brought up saw-dust and *sand mixed*.

In front of the island is a quantity of slabs, buttings, and saw-dust, but none in the navigable channel of the river.

We then steamed to the Buckingham wharf, and waited for the *Queen Victoria* In closing to the wharf we observed much *saw-dust upturned* by the buckets.

Next morning we proceeded to examine the Ottawa Bay, carefully commencing with that arm of it from which the Rideau Canal enters.

We took the soundings in the line of the centre of the lock, at pretty even distances of about twenty feet apart.

We found the water on the stop-log of the lock to be 8 feet 3 inches in depth, the river then being about 2 feet above low summer level. At 20 feet from the stop-logs we found the water 8 feet 0 inches; bottom clear, stones, and gravel. At 40 feet from same, the water was 7 feet 9 inches, bottom gravel and stones with some remains of an old dam, not removed. At 60 feet from same the water was 7 feet 0 inches, with similar bottom.

At 80 feet, water 8 feet, bottom slabs and mill rubbish.

At 100 feet, water 7 feet 9 inches, bottom slabs and rubbish embedded in saw dust.

At 120 feet, water 7 feet 0 inches, bored 6 feet through rubbish, stopped by slabs and logs.

At 140 feet, water 6 feet 3 inches, bored 13 feet through rubbish, could find no bottom to it.

At 160 feet, water 6 feet 6 inches, could find no bottom to it.

At 180 feet, water 7 feet 0 inches, could find no bottom to it.

At about 170 yards from locks, 8 feet 6 inches water, bored 11 feet through rubbish, stopped by slabs.

From this point outwards towards the river the water deepens gradually, until we ceased to find bottom with an 18 feet rod; we had not sufficient depth of iron to test the bottom below that depth. Reducing the level of the water as it stood at the time of our inspection to that of *low* summer level, the above soundings shew that the depths, for 70 yards from the lock, would be but as follows, viz.:—6 feet, 5 feet 9 inches, 5 feet, 6 feet, 5 feet 9 inches, 5 feet 6 inches, 4 feet 3 inches, 4 feet 6 inches, 5 feet, 6 feet 6 inches.

In the shallowest places the upper 3 or 4 feet of the waste deposit was pretty loose, but at from 6 to 8 feet down we found a very hard crust, difficult to force through but when pierced with the boring rod a great quantity of very bad smelling gas was forcibly ejected from below. We were informed that this gas occasionally makes its way up violently, so much so that when the water is frozen to a considerable depth over the bank of saw-dust, it upheaves the material of the bank with the ice on top of it.

From the Rideau Canal Entrance Bay we went up to near Pine Tree Island; we were accompanied by Captain McNaughton, whose services and assistance we gladly availed ourselves of. He is a practical navigator, possessing a thorough knowledge of the river, and well qualified therefore to guide us, as we requested he would, to all the places where he thought obstructions, caused by saw-mill waste, were to be found.

He brought us to an extensive shoal nearly opposite Mr. Gilmour's home, below Pine Tree Island, and extending down the river about 250 yards. On the south side, this deposit of slabs, edgings, &c., in some parts united by saw-dust, *extends wholly across the river*, until it reaches near the shore at the foot of the hill.

The soundings on *this bank*, which a few years ago was a *deep, navigable channel*, taken in a line with the south side of the island, and about 250 feet below it, were as follows:—5 feet water, bored through 14 feet slabs, rubbish, &c., could not force the iron further.

2 feet water, thence down, all slabs, &c., &c.

5 feet water, thence down, all slabs.

4 feet water, thence down, all slabs.

6 feet water, thence down, all slabs.

7 feet, no slabs and deep water, thence as gets closer to the shore, distant about 80 feet.

One hundred yards below the island, in the *very tortuous* channel now necessarily used, there is 6 feet water, and 10 feet 6 inches of slabs lying on a rock bottom, in a pretty strong current.

Fifty yards below the Island, in the channel, is 10 feet 6 inches water, rock bottom, and *strong current*. A short distance further, 8 feet water and 12 feet 6 inches of slabs, sawdust, &c., *strong current*.

We then went around the Island to the north shore, found no slabs or saw-dust in this channel, which in places is naturally obstructed by crossing reefs in the bottom. On the Island side of it, we observed a jam was commencing.

In this channel, notwithstanding the strength of the current through it, a solid dam of slabs, edgings, &c., bound with saw-dust, was formed last year; which after breaking off from the shore was swung round by the current, and, as Capt. McNaughton believes, now forms portion of the mass which we examined previously on the south and lower side of the Island.

We moved down the river again below the Island, and found the steam tug "Aid" was stuck on top of the deposit of slabs, &c., in trying to work round in the crooked channel created by the deposit.

We again crossed the river to Messrs. Wright and Batson's wharves, and sounded all along the face of them. We found no deposit.

We continued our examination of the north side of the river, further down, and found nothing in the channel. Capt. McNaughton now informed us that he had shown us all the obstructions from mill waste he knew of in that portion of the river.

As an example of the difficulty of determining, in a short time, the real nature of the bottom, the following facts are adduced :—

Mr. Girard, a master ship carpenter, was employed last year to prepare "ways" to haul up a steamer for repairs. He laid down the timbers for it about 300 yards below Currier and Batson's mills, upon what he considered to be a solid bank, but upon the vessel being hauled up, her weight forced the timbers through the hard crust, and sank them down several feet, evidently from a large deposit of sawdust having been covered over by a thick stratum of other material.

Having now described the course we took in making our inspection of the Ottawa, the principal ground of our inquiry, we return to notice the allegations in the petition presented against the proposed enactment for the better protection of the navigation; and, after that, to offer some remarks upon the reports of Messrs. Greene and McAlpine in support of the petition.

In this petition it is asserted, that by-water cannot possibly be prevented. On the contrary we proceed to state cases established beyond question that it is perfectly possible to do so with the exception of a trifling inappreciable amount.

At Bobcaygean, there is a new and very extensive saw-mill driven by water. In the construction of it, the principle was adopted of preventing the saw-dust from getting into the river, and it has been carried out most effectually as none of it can escape, save a portion so trifling as not to be worthy of notice, which must find its way down by the "Pitman" connecting the water-wheel with the saw-gate. It may be said, therefore, that practically, and so far as at all to injure the navigation, the saw-dust is excluded from the water of the river.

Mr. Boyd, the proprietor, has it carted off to form service ground and to back the extensive wharves, the fronts of which he builds up with the slabs, &c.

As Lindsay, there is also a saw-mill, driven by water, to which a small furnace for burning the saw-dust is directly attached. On our visit, the furnace was found in operation, and it answered the purpose perfectly, when the sawdust is thrown into it; however, when no supervision is expected, there are ample opportunities of getting rid of it by simply discharging it into the river through openings left for the purpose in the floor on which it is collected. As to the portion of saw-dust created at steam mills over the quantity used up in the furnaces, there are several creditable instances where it is utilized in the formation of piling ground, backing wharves, &c., among which may be mentioned the extensive mill at the mouth of the Trent, owned by Messrs. Gilmour, and that on the west bank of the St. Maurice, Messrs. Stoddart, proprietors. The petition under consideration further states, that if an enactment compelling saw-dust to be kept out of the river is enforced, it would compel the proprietors of the Chaudière mills to close and remove elsewhere.

From our observation of the very little expense attendant upon the collecting and carrying off the saw-dust from those mills where it is practised, although by means very insufficient and very imperfect in comparison with what might easily be devised, we are of opinion that the enforcement of it by legislative enactment would entail upon the mill proprietors' generally, but a very trifling percentage on their profits.

The principal difficulty to be dealt with, is the case of the Chaudière mills. Here unfortunately many extensive mills have been crowded upon a space so small as barely to afford room for the piling of two or three days' produce. In more than one case, it is stated that there is no piling ground attached at all. The possibility of depositing further saw-dust around those mills is utterly out of the question.

Three or four reasons may fairly be given for all those mills having been (as it appears now) so imprudently crowded together. Firstly, a steam saw mill at that time was scarcely thought of. It is now admitted by some of the principal men in the trade, that had they again to erect mills, they would adopt steam mills, from the

power of placing them exactly in the spot they considered most eligible, and the economy, and certainty of their steady working, irrespective of climate, &c. Secondly, the locality appeared to afford an opportunity of obtaining their working power at a trifling outlay, and to dispose of their waste by simply throwing it into the river, as there was no prohibition to the contrary; and, thirdly, that until a very late period, there was no facile route by which their produce could be sent to market, but by the river, at the head of the navigation of which they naturally desired to have their mills.

The several additional routes afforded by railways now constructed, and about to be constructed, will doubtless very much determine the sites of mills hereafter, and the adoption in most cases of steam instead of water for motive power.

Had stringent regulations existed against the deposit of the waste in the river, there is little doubt, that even for water mills, a number of sites, along the river, would have been found, from time to time quite sufficient for the demands of the trade.

It appears to us, that the case of the Chaudière is the only one where any difficulty is to be met with, in regard to the depositing of the waste. As already stated there is no room for further deposit of it on the ground.

The proposition to get rid of it by combustion in cupola furnaces, with tall chimneys grated on top, and in convenient positions, is scouted by the proprietors as being in their opinion, very likely to be the cause of not only endangering their properties, but also the safety of the city. Of this we are not convinced from the fact that no such consequences have attended the burning of all the saw-dust consumed in the steam mills, and much greater safety might be obtained by means of proper cupolas. But leaving that question aside, we believe that should it be eventually decided by the Legislature, on more extended information *than has yet been adduced* as to the injurious effects of saw-dust upon navigation, that none of it shall, in any case, be allowed to be thrown into the rivers, these larger capitalists would soon devise means for otherwise getting rid of the nuisance, than by closing up and removing their establishments.

At Belle Ewart on Lake Simcoe, much the larger portion of all the waste produced by steam mills situated there, and producing as we are informed about forty-millions of feet annually, has been for years, and is still, burned on the ground, without any accident having occurred; of course we do not intend, by any means, to say that such a system is advisable, but simply to shew that proprietors, so deeply interested, are not apprehensive. It is further stated in the petition under consideration, that the practice, for fifty years, of throwing all the waste from the mills upon the Penobscot and Hudson Rivers into the water, has not injured the navigation.

We were desirous of visiting the Penobscot, Miramichi, St. John, and the St. Croix Rivers, but had not sufficient time. Those rivers, however, are *all tidal rivers*, and so far as the influence of the tides extends, we did not consider their cases analogous to those of the rivers we had to report upon; but there may be some rivers in the States upon which lumbering is carried on, similar, as regards their constant down currents, to the Ottawa, from an examination of which, and of the upper portions of the rivers named, valuable information might be had to be a guide for the course to be adopted here.

Opposed to the statement in the petition respecting the Penobscot, we have quoted from General Thom's report (see page 42) that such disposal of the waste *has greatly impaired the navigation* of the Penobscot River—that the waste is *forming constantly, increasing obstructions* to the navigation, and had attracted public attention so strongly that the throwing in of slabs and sidings is now *positively prohibited by statute*, and that it was *very much to be regretted* that saw-dust was not included, but it is believed *that it will be at an early day*.

That similar injurious effects are produced in the Miramichi River, from the same causes, is distinctly shewn in the communication of the Hon. Mr. Muirhead, (see pages 44, 45, 46, and 47), and so strong is his feeling as to the great necessity of effectually stopping the discharge of mill waste into rivers, that he recommends that

the penalty for doing so should be the imprisonment of the proprietor or the person in charge of the mill.

The views of Professor Greene, upon the subject under discussion, are based partly on a long series of ably arranged theoretic calculations, in which Mr. McAlpine expresses his full concurrence.

Indeed the views of the two gentlemen are alike, and expressed in nearly the same words, so that it appears to us unnecessary for our purpose to do more than compare Professor Greene's conclusions with those we have drawn from the results of our own examinations, more especially as his views are shewn from the reports to be diametrically opposed to those of General Thom and the Hon. Mr. Muirhead.

Besides the calculations adverted to, the correctness of which is not to be disputed, Professor Greene states, he is confirmed in his opinion also by the *experiments* he has made, to which, with great respect, we cannot attach much weight. The results which could be deducted from the *diminutive scale* upon which his experiments were made, namely by *passing sawdust and water through a shoot of but 4 feet in length, 3 inches square in section, and made of smooth boards* appears to us very insufficient to determine the real practical effects of the vast volume of water passing down a river such as the Ottawa, varying as it does, so immensely, during its course, in breadth, depth, and velocity; its bottom in some places crossed by projecting ledges of rock, and throughout varying in its character, of which Professor Greene has made no examination. No one will deny that to obtain with certainty the true velocity at any one point, the *actual section* of the water there must be accurately ascertained, as it together with various other concurrent circumstances, viz., nature of bottom, the direction of and turns in the channel, etc., etc., etc., must govern the velocity.

In aiming to obtain this section, Professor Greene assumed breadths and depths, which he took from *maps that had been some years before made at different periods* under the direction of Messrs. Shanly and T. C. Clarke, Civil Engineers, whose services had been engaged by Government, to submit plans, etc., for the improvement and extension of the Ottawa River navigation. These maps were, no doubt, perfectly reliable for the purpose for which they were made. They are drawn in part from actual survey of intricate portions of the line, necessary for the determining of the position and nature of the works of construction; for the remainder, they were but compilations from maps previously published.

It is reasonable, therefore, to infer that, as the maximum depth proposed for navigation was about ten or twelve feet, they did not permit time to be unnecessarily lost in *determining the depth much below that*. The same observations apply with even more force to the *determining of the breadth*. In those parts of the river where by a glance the breadths were seen to be far in excess of that required, they *certainly would not waste time in ascertaining whether it was 1,000 or 10,000 feet*. If this inference is received, the *correctness of the data assumed by Mr. Greene, in determining the sections and velocities of the current at the various points so minutely as down to the fraction of 0.20th foot per second, is to us very questionable*.

Before or since making their reports, we are not aware that either of these gentlemen had ever examined the Ottawa River.

Professor Greene, from his theoretic calculations, states that saw-dust and sand combined *cannot be found under any circumstances*; and further, that, when saw-dust may be temporarily lodged in a channel, it is *swept off by the next freshet*. Our examination (see pages 17 and 18) shew the contrary.

Professor Greene further says, that saw-dust alone can never form obstructions in the channel. Our examinations do not show that there are any bars, *up to the present*, of *sawdust* in the navigable channels, which obstruct the navigation of them. But those examinations, as well as the various authorities quoted herein on both sides of the question, establish clearly the fact, that the admixture of sawdust has a very considerable and injurious effect in binding together, and converting into a permanent dam or bank, the slabs, edgings, etc., which in the first instance merely lodged on the bottom.

General Thom illustrates forcibly, in the case of the Penobscot, the injurious effects of *saw-dust* thrown into the rivers, by its forming, in the *slack-water parts* of the navigation, *extensive* and shifting shoals, with narrow and crooked channels. These effects have not yet been produced in the Ottawa; but it is not easy to foresee what the result may be hereafter, from the discharge into it annually, as at present, of about eight millions of cubic feet of *saw-dust alone*, irrespective of the slabs, edgings, sidings, etc.

As to the correctness of the conclusions of Professor Greene, derived from his calculations of the velocity of the current in several parts of the Ottawa, as well as also upon his own experiments, we have ventured to express our doubts. First, because the data upon which his calculations are founded do not appear to us to be derived from distinctly established facts, as to breadths, depths, etc.; and, secondly, because we look upon the scale upon which his experiments were made as being much too diminutive to derive reliable conclusions from. (See pages 72, 73, and 74.)

As before stated, neither Professor Greene nor Mr. McAlpine has ever examined the Ottawa; they, therefore, cannot be supposed to be acquainted personally with the character and irregularities of the bottom, and a variety of the circumstances which must materially affect the nature and places of the deposits.

The six specimens of the bottom, which Professor Greene says he examined and could not find any traces of saw-dust in, were furnished to him, not taken up by himself.

Mr. McAlpine states he had many occasions of seeing the material taken from the bottom of the canals, and never saw any saw-dust in them.

To ascertain with certainty whether saw-dust does exist in such materials after long immersion, requires *very close* attention.

Several of the specimens we ourselves collected from the bottom, at the Petite Blanche, Le Lièvre, and elsewhere, when examined immediately on *being taken out of the water*, we set down as containing but a very trifling proportion of saw-dust; but subsequently, on examining the same specimens when *dry*, we found the proportion of saw-dust combined with the sand to be *much greater*.

After having made the examinations (detailed in the foregoing) of the River Ottawa, at and below the city, we went by rail to Arnprior.

On arriving there, we met Mr. McLachlan, of the firm of Messrs. McLachlan & Brothers, who are the proprietors of mills at that place. This gentleman arranged to meet us next morning, at his mill. We did not find him there, but we met Messrs. Meech and Kingston, who respectively manage the concerns of Messrs. Conroy and the Hon. James Skead on the Madawaska, by whom we were conducted to the extensive Government boom at the mouth of that river. Most of the waste from these mills appears to be discharged into the water, at the lower end of the boom, near a small island. There is a great accumulation of saw-dust brought down from Messrs. McLachlan's mills, and lodged there. The depth of water on this bank, at the period of our visit, varied from eight inches to five feet. The water in the lake then stood, as we were informed, one foot six inches over low summer level. This filling up of the boom seriously interferes with the lumbering operations within it. We saw a very large number of heavy logs lying on top of the bank so formed within the boom.

A little more out in the lake, and parallel with the boom, there is a sand bar stretching down a considerable distance, and upon the shallow part of this bar, and between it and the shore, the sawdust has gathered, and continues down along it. Should this deposit of sawdust continue in its present position, the booms will in a little time be rendered useless.

The amount of lumber produced annually at Messrs. McLachlan's mills is about twenty millions of feet.

We next visited Carleton Place, and examined the mills there; a steam mill owned by Mr. Caldwell, and water mills owned by Messrs. Gillies & McLaren. Mr. Caldwell is building and Messrs. Gillies & McLaren have built a cupola furnace for the burning of the waste, which works satisfactorily at a *very trifling* expense, and gives no trouble.

By a simple contrivance, the slabs, edgings, &c., are put in cars which run on a tramway to the mouth of the furnace. On arriving there the load is tipped or dumped by a boy into the fire. Below the mills, the river is *clear of waste* of every kind except saw-dust. The mills of Mr. Caldwell and of Messrs Gillies & McLaren produce annually about twenty-five millions of feet of lumber.

We next proceeded to Napanee, and at once put ourselves into communication with the Mayor, and several other gentlemen interested in the navigation of that river.

At the foot of the rapids, immediately below the mill in the town, there is a very great amount of waste for some distance down, in fact the course of the river has been all but closed, and the navigation stopped.

A channel has lately been dredged through it which is very narrow, not allowing two vessels to pass each other. The stuff brought up was composed of stones, gravel, sunken logs, slabs, and some saw-dust, but a considerable area of the river, over which there was formerly from eight to ten feet of water, and which, within the recollection of Mr. Herring, was available for steamers and other craft, is at present *filled up and dry*.

We drove up the river to a large saw water-mill, about eight miles above the town, worked by Messrs. Rathbone & Sons. It would appear, that, for some time past, appliances, but of a very imperfect nature, have been made use of for carrying away the slabs, saw-dust, etc., for the formation of service ground, etc., and the making of wharves. This was the case at the period of our visit; but, from the several banks of refuse we observed at sundry parts of the river below the mills, there is no doubt that a large quantity of the waste is occasionally thrown in.

There are eight saw-mills above the town of Napanee, nearly all of which deposit waste in the river.

We then obtained a small boat and went about a mile down the river to a new steam mill; a bar has been formed there also, but it is chiefly of sand. A large bank of sawdust has been formed along the side of the river, there being but little current in it. In the centre of the river, except at the places already mentioned, there is no collection. The bottom is pure sand, from which it is to be inferred that the saw-dust not deposited on the bank above mentioned is carried into the bay or arm of the lake leading to Belleville.

A large proportion of the deposit directly at the foot of the rapids at the town, is water-logged bark. This accumulation of bark is owing to most of the logs being boomed in the river for two years, the smallness of the stream not permitting it to be (as the lumbermen say) *driven* in one season.

The logs in the river are in a great part stripped of their bark, which being very heavy sinks on falling into the water. The lower part of the bar is much mixed with slabs, edgings, etc., and with but little saw-dust. In the opinion of the gentlemen of the town accompanying us, but little sawdust would remain in the river but for the slabs, etc., which collect in it.

After finishing our examination at Napanee, we proceeded to Belleville. We arrived there in the evening, and early next morning waited on Mr. Flint, the Mayor, and also upon the Hon. Mackenzie Bowell, the representative of the county; upon Messrs. Brown and White, M.P.'s, Mr. Vandusen, and others.

Having procured a boat and crew, we commenced our examination of the harbor and entrance to it, attended by the captain of a schooner, who had traded to this part for many years; we were informed by him that the entrance channel, from the *shifting of the sand*, has to be buoyed out every year; that when this is done, a fair but not straight channel, with sufficient water, is obtained.

SOUNDINGS AT BELLEVILLE.

Outside the harbour, in a direct line with Front street, at intervals of about 100 yards:

1st,	14 feet	of water,	12 feet	of saw-dust	down to hard bottom.
2nd,	6	"	5	"	"
3rd,	4	"	5	"	"

Ship Channel:—11 feet of water—4 feet saw-dust.

East Side Channel:—6 feet water—3 feet saw-dust.

6 " 2 "

Channel near entrance to Harbour:—10 ft. 6 in. water—3 ft. saw-dust in hard bottom.

9 6 " 2 " "
11 0 " no saw-dust—hard rock.

Near Island:—9 feet water—no sawdust—gravel.

6 " " rock.

West Side Harbour:—6 feet to hard bottom—no sawdust—gravel.

Main Channel in the Harbour, East Side:—10½ feet water—no sawdust—gravel.

10½ " " "
11 " " "

11½ " 3 feet pine bark.

Opposite to Mills, East Side of Harbour:—8·6 water—3 ft. pine bark—no saw-dust.

8·6 " 3 " "

7·0 " 2 " "

7·6 " 1 " "

7·6 " 2 " "

4·6 " 4 " "

8·0 " gravel " "

8·0 " rock " "

7·0 " " " "

5·6 " " " "

In the roadstead, the deposit is *pure saw-dust*, at the entrance to the harbour it is *mixed bark and saw-dust*, and within the piers it is chiefly *bark* with some saw-dust and gravel.

There is a very extensive boom, close to Belleville, anchored immediately at the foot of the rapids there, and a very large collection of logs, off which the bark is stripped in their passage through the rough rapids. This bark is carried down the rapids, and from its weight sinks at once in the inner harbour. It is chiefly by the lodgment of this bark, and by the stones and gravel brought down on the break-up of the ice, that this harbour suffers. It is the outer portions of the harbour, and the entrance and channels leading to it, that are principally affected by the deposit of *saw-dust*. And notwithstanding that the depths in these channels is annually found to be sufficient for navigation, yet much inconvenience results from the variations in their courses and directions, caused by this *deposit* of saw-dust, thereby creating the necessity of buoying them out anew every spring.

Having concluded our examination at Belleville, we drove up to the mouth of the Trent, where the Messrs. Gilmour & Co., of Ottawa, own one of the finest steam mills probably in the Dominion. It has all the modern improvements; the arrangement by which the waste required for the furnaces is conveyed to them is very complete, and such of it as is not required for fuel is otherwise utilized. None of it is allowed to escape into the water.

The place next visited in this section was Shannonville, to which we were kindly accompanied by Messrs. Bowell and White, M.P.'s. The river at this place is affected by the discharge of saw-dust in much the same manner as the river at Napanee, and, although in a smaller degree on account of its lesser size, its navigation is equally impaired. Some years ago, as stated by Mr. Holden, an old resident of the village, barges and steam tugs could ascend the river to within 80 rods of the village, and lie alongside the bank to load with staves, &c., for the Quebec market. No vessel can now get up within half a mile of the old dock. From the present head of navigation, for a length of from half to three-quarters of a mile on each side of the stream, are large deposits of slabs, &c.: the channel is thereby rendered narrow and crooked.

From the saw-mills below the village some of the waste is carried away during the day. From the head of the present navigation down to the lake, a vessel drawing eight feet of water can at present freely pass up and down, but at this point a large bar of sand extends quite across, with a small portion of saw-dust intermixed.

The channel there is so narrow and crooked that it is scarcely possible to get a scow up through it. In low water, a great deposit of sawdust takes place on it, which in freshets or a gale from the lake is removed.

The remains of these deposits of saw-dust, on our visit, were visible along the shore for a considerable distance. Upon the bar there was not over five feet of water at the time of our inspection.

By some of the replies we received to the circulars we had addressed to members of Parliament, and other parties interested in the maintenance of the navigation of the line of waters usually understood to come under the head of the "Trent Navigation," these are Bobcaygean, Fenelon Falls, Balsam Lake and Lindsay.

The engagements of two of the undersigned rendering it absolutely necessary that they should return to their homes, it was settled that Mr. Killaly should proceed alone and make an examination of the above-named places. The following are the results of it:—

Having hired a boat, he commenced up-stream at the village of Coboconk in the "Gull River," an extension of the Trent. At this village a dam was constructed across the river, creating a fall of from six to eight feet, by which a saw-mill was worked.

The whole of the waste from this mill was thrown into the water. It is no longer worked and is in ruins, but it is understood that a new and extensive one is about to be erected. About six miles above Coboconk, on the river, is McLaughlin's saw-mills, also depositing all the waste in the river. From Coboconk down to the upper entrance of Balsam Lake (about two miles) slabs, edgings, &c., are to be seen, in some cases in large quantities along the shore; but little saw-dust was observed, and the navigation was unobstructed by it. From this point across Balsam Lake, about four miles, the navigation is not interfered with. Immediately at the lower entrance to this lake, across that part of the river which connects Balsam Lake and Cameron's Lake, there is a swing bridge, the span of which is very insufficient for the passage of steamers and barges. Close above and below this bridge there is a shoal with not more than four feet of water upon it, at the time when the level of the river was about 18 inches higher than extreme low summer water.

Three-quarters of a mile below the bridge a lock and a dam across the river were constructed a few years ago; the fall at which is from two to three feet. Below this lock and dam to the upper entrance of Cameron's Lake, there is, in several places, a quantity of slabs but no saw-dust. What the parties interested in the navigation complain of here, is, that the tortuous branches of the river are in spring so completely boomed up and filled with logs, and that for a considerable time they had to suspend the running of their steamers and barges, and finally to withdraw them from that portion of the navigation altogether.

A short cross cut from a sudden bend of the river to the lake would completely remove the cause of this complaint. It also could be used for navigation, leaving the whole of the river to be boomed off in such a way as to suit the requirements of the several lumbering parties. From the head of Cameron's Lake down to Fenelon Falls, about three miles, the navigation is unobstructed. At the falls the water drops down perpendicularly over a ledge of limestone rock about twelve feet; this fall is increased a few feet by the dam which has been built upon the top of the natural ledge of rock for the purpose of increasing the depth of water above. If this dam had been raised a few feet more the navigation would have been much improved, and the building of the present lock near Balsam Lake rendered unnecessary.

FENELON FALLS.

There is a considerable and rapidly increasing village here, and two water saw-mills, one on each side of the river immediately at the town; that on the south side is a new mill, producing in the season from eight to nine millions of feet of lumber. In this establishment they *profess* to dispose of the waste by carting it away and burning it; however, but very little traces, if any, are to be found of this being done.

but on the contrary, every facility afforded for the direct discharge of it into the water underneath, through openings left in the floor under each gang of saws. The foreman stated that the saw-dust is gathered, filled into large wheelbarrows, wheeled to and tipped into a hopper in the corner of the mill, from which it is drawn up by a contrivance for that purpose, (very imperfect and insufficient), and is ultimately thrown into waggons, carted off and burned.

On inspection the traps in the floors were found all open, and one entire side of the hopper was knocked out, thus presenting a large aperture for the saw-dust, if wheeled to it, to fall into the river. The whole of the bark—no inconsiderable quantity—is thrown from an opening in the upper floor into the river. In the mill on the town side of the river, the produce of which is stated to be about six millions of feet of lumber annually, it is not pretended that any means are taken to dispose of all the waste otherwise than by throwing it into the river. Near the entrance into the lake, there are two large stream saw mills, one on each side of the river. Most of the saw-dust is consumed in the furnaces, but the remainder, and a large part of the waste generally, seems to find its way into the river. Besides these mills there are two small steam mills at which shingles, etc., are produced. The aggregate produce of the mills below the falls is estimated at 34 millions of feet annually. In the spring the river from the town to the lake is almost wholly blocked up with logs, and the steamers have to stop at the lower mill, near the lake, and land their passengers on rafts or logs lying there.

Over a large area at the head of this (Sturgeon) Lake, slabs and sidings, etc., have sunk, seriously interfering with the navigation, when the water in the lake is low—thence to Bobcaygean there are no impediments to be found.

BOBCAYGEAN.

The former mill at this place was located in the line of navigation and discharged a large part of its waste into the river, directly at the tail of the lock, thereby causing considerable and constant obstruction to the navigation. The old mill is no longer worked. Mr. Boyd, the proprietor, having erected in its stead a splendid water-mill, on the other side of the river.

This mill was constructed on the principle to admit of no waste from it getting into the river, and it has been most effectually and satisfactorily carried out—as it may justly be said that the trifling amount of it that finds its way down by the “Pitman” is unworthy of notice—the whole of the waste of every description is utilized.

SCUGOG RIVER.

Across the lake no impediment is found until reaching the mouth of the Scugog River: thence up to the town of Lindsay, in the comparatively still water of the circuitous channel of the Scugog, and throughout, a quantity of slabs, etc., is found. Some very bad bends in the river leading to it have been improved by Government, but there are others equally in need of such improvement.

The Scugog navigation passes through the town of Lindsay, immediately whereat is a lock and a dam across the river, and on it a flour-mill and saw-mill, both driven by water. The saw-mill produces about two millions of feet of lumber annually. It has a small furnace immediately attached to it, which, *when used*, answers the purpose well; but appearances below it but too surely indicate that this furnace is not constantly resorted to.

The proprietors of the saw-mills below it complain that the quantity of saw dust going down seriously interferes with their feed pipes. The interests of this navigation, of no little importance, appear to have been very much overlooked. Independently of the impediments from slabs, etc., this neglect is shown in the manner in which the wharves constructed by the respective saw-mill owners, for their own use and convenience, have been allowed to encroach on the river, and also by the very awkward direction, so far as navigation is concerned, of the railway bridge across it,

to steer through which, in the narrow breadth of the river, the steamer or barge has to steer nearly across the stream, and almost before her stern is free of the bridge she is stem on a saw mill wharf projecting into the river on the opposite side. The free use of the canal also for the town purposes is greatly obstructed by the manner in which the railway, with its freight sheds, etc., have been allowed to be located.

It is further complained of, that it lies within the power (which is often exercised) of the mill proprietors at Bobcaygean, and of the owner of the mills on the dam, across the river in the town of Lindsay, to draw down the water below the level required for navigation (both above and below the town), much obstruction to which is thereby frequently caused.

RIVER MUSKOKA.

The navigation of the three considerable Lakes, St. Joseph, Rosseau and Muskoka, has been connected by means of a lock, etc., lately constructed a short distance below the west or lower end of Lake Muskoka; at the upper end of it the River Muskoka enters; at a distance of 7 or 8 miles it divides into two branches. On the east one, about two miles up, are the "High Falls," of about 160 feet. The north branch continues navigable up to Bracebridge, the county town, of respectable size, and rapidly increasing. Here also are considerable falls, the foot of which is the head of navigation.

In the immediate vicinity of the town are two steam saw-mills, and a water saw-mill; within a few miles of the town, further up the river, are three more water saw-mills. The waste from all the water saw-mills has hitherto been thrown into the river, in consequence of which the fine basin at the foot of the falls, in the town, in which steamers, etc., could formerly lie and swing round, is now completely blocked and rendered useless, by the accumulation of a large shoal in it, consisting of slabs and other such mill waste, sand and saw-dust.

A wharf at the head of this basin, at which the vessels used to be moored, had to be abandoned and another built at the lower end of the basin. The Muskoka River brings down every spring heavy floods, and it is believed that if the throwing in of the saw mill waste was put a stop to, this basin could easily be restored to its original useful state.

It now only remains for us, after submitting a few general remarks upon the subject of our Commission, to state the means we respectfully recommend for putting a stop to obstructions in navigable streams and rivers.

Having represented the extent and importance of the lumbering interests on the Ottawa, we deem it but proper to show also the present extent and importance of its navigation interests.

The capital invested in steamers and barges engaged on it was, in April, 1872, one million two hundred and fifty thousand dollars; the number of steamers forty-five, and of barges two hundred and fifty-one, the number of men about two thousand.

In the year 1871, there were conveyed down the Ottawa, by those steamers and barges, two hundred and sixty millions of feet of lumber. The quantity produced is largely increasing annually, and the number of vessels increases correspondingly.

From the above it is evident that the parties engaged in lumbering are deeply interested in the navigation, but unfortunately it seems only so far as *the keeping of the channel open*.

The tolls paid to the Government, in 1871, from the Ottawa Canals alone, amounted to about \$100,000, and from the up freight about \$50,000.

The amount to be expended on the improvements of the navigation from the city of Ottawa to the River St. Lawrence is calculated at about two millions and fifty thousand dollars.

The views and opinions, submitted in this report, of all those who maintain that the discharge of *saw-dust alone cannot and does not impair the navigation*, it may be observed, are confined specially to *the channel of the river*; as, for instance, if a suffi-

cient depth for the passage of vessels from the Chaudière to the St. Lawrence is left in the channel, the navigation of the river is not impaired. They all admit, and truly, that the saw-dust is, in the first place, lodged in the *quiet bays and eddies*, generally, along the river, (the very places where, as the country and trade increase may be found the best suited for the various wharves, etc., which may from time to time be required), and that as these become filled up, the current, increased by the contraction of the river, will then carry the *saw-dust* still continued to be thrown into the river, (at present at the rate of about eight millions of cubic feet annually of *saw-dust alone*, independent of slabs, etc., etc.), further down, until it is finally deposited, no one knows where.

That the saw-dust is so lodged, it is only necessary to inspect McKay's Bay, the shoal at the mouth of the Petite Blanche, and the bay at the entrance of the Rideau Canal, which may be fairly looked on as the natural inner harbour for the city, to which it presents the easiest access. On this bay had been the principal landing place, until the blocking up of it made it comparatively useless.

The state of the entrance to Belleville Harbour, at the mouth of the River Moira, is a further and strong illustration of the injuries resulting from the deposit of saw-dust.

For the interests of the city of Ottawa, it is most important that all the river frontages adjoining the city should be kept from being filled up. As leaving aside any consideration founded upon the probability of a through water communication being opened at some future day, by the line of the Ottawa, from the cities of Quebec, Montreal and Ottawa to the "Great West," it is certain a vast increase in the trade of this city and river must keep pace with the rapidly increasing prosperity of the country, and that every portion of river frontage in the neighborhood of the city must become daily of more value, as it will all be required for shipyards, building and repairing slips, wharves, landing-places, etc.

Finally—after careful consideration of all the circumstances, and keeping in view the importance of both the great interests involved, we respectfully recommend:—

First.—That a Bill be introduced into the House of Commons, by which it would be enacted that the throwing into any lake, river, or stream whatever, of any refuse from saw-mills, except saw-dust, shall be strictly prohibited, under severe penalties, to be fixed on, and that such prohibition shall be enforced from the date of the passing of such Bill.

Second.—That no opening whatever shall be permitted to be in the floors or walls of any mills now in existence, or to be erected, except those required for lighting and ventilation, and all such openings shall be fitted with gratings, well and permanently secured and fixed, the openings through such gratings not to exceed one inch square.

Third.—That an officer should be appointed under this Act, whose duty it should be to see that the provisions of this Act were strictly carried out, such officer to be empowered to summon before any magistrate of the vicinity any party he would detect, or have satisfactory evidence against of having contravened the provisions of this Act.

After all descriptions of saw-mill waste, except saw-dust, have been prevented by this Act from being thrown into any lake, river, or stream whatever, should it be proved to the satisfaction of the Government, that the continued discharge of pure saw-dust does and will impair the navigation, or create impediments thereto in any manner, the Government shall have the power in such case to exclude it in the same manner as provided against the deposit of the other refuse. Six months notice thereof to be given to the mill proprietors.

All of which is respectfully submitted.

HAMILTON H. KILLALY
Chairman.

R. W. SHEPHERD.

JOHN MATHER.

LIST OF APPENDICES.

1. Copy of a petition signed by Messrs. Gilmour & Co. and 17 others against the Bill introduced into the House of Commons by R. J. Cartwright, Esq., M.P. for County of Lennox.
2. Copy of 1st report of Prof. Greene to Mr. Bronson, on subject of Commission.
3. do 2nd do do do do
4. Copy of affidavit of Hon. W. J. McAlpine.
5. do report do do do
6. do affidavit of Thomas McManus.
7. do do Jeremiah Finch.
8. do do Levi Young.
9. do do Henry Swalley.
10. do do J. M. Wilson.
11. do do John Keenan.
12. do do David Underwood.
13. do do Joseph Russell.
14. do Letter from Geo. Richards to Mr. Bronson.
15. do do Judge Rosekran to Commissioner of Public Works, Ontario
16. do Affidavit of D. H. Sullivan.
17. do do A. Sherman.
18. do do Geo. Satterlee.
19. do do Col. J. W. Morgan.
20. do do Geo. W. Nelson.
21. do do W. Coleman.
22. do do Orson Richard.
23. do Memorandum from A. J. Russell, Crown Lands Department, on the water-shed, &c. of the River Ottawa.
24. Communication from General Thom, Bt. Brigadier General, U. S. Artillery, to Hon. H. H. Killaly on subject of Commission.
25. Communication from Hon. W. Muirhead to Hon. H. H. Killaly on subject of Commission.

APPENDIX No. 1.

To the House of Commons of Canada in Parliament assembled.

The petition of the undersigned, humbly sheweth :—

THAT your petitioners represent a very large capital invested at the Chaudière and elsewhere on the Ottawa and its tributaries, by themselves and others employing at least 8,000 men and 3,000 teams, and producing a very large addition to the exports of Canada, amounting to 400,000,000 of feet of lumber and \$1,000,000 of value annually.

THAT the proposed legislation with regard to navigable rivers and streams will act most injuriously on the important interests your petitioners represent, inasmuch as the mills they work, being water mills, it is impossible to prevent saw-dust falling into the river, and that the enforcement of the Bill will, as your petitioners believe, compel them to close their mills, and remove their operations to other localities where steam power can be used, thus injuring your petitioners, and also the city and other districts affected.

THAT your petitioners recognize fully the importance of maintaining the navigation of the Ottawa River, in which they are largely interested, but they represent they are in a position to prove, as well as from the result of actual investigation of

the River Ottawa, as from the experience of similar operations during fifty years past on the Hudson and Penobscot Rivers, that navigation is *not injured* by the *falling into them of saw-dust*, which is carried off and dispersed yearly by the spring freshets.

Your petitioners therefore pray that the subject may be fully investigated, and that opportunity be afforded them to submit scientific and practical evidence in support of the allegations of this petition, in order that a grave injury and injustice to a great industry, may not be unwittingly perpetrated. And your petitioners, &c.

(Signed,)

GILMOUR & Co., and 17 others.

True Copy.

"

W. B. LINDSAY,

Clerk H. of Commons.

Clerk's Office, House of Commons, 29th November, 1871.

APPENDIX No. 2.

H. F. BRONSON, Esq.,
Ottawa, Canada.

SIR,—I have examined the questions submitted by you, as to whether there is any reason to apprehend the formation of obstructions to the navigation in the Ottawa River, as the result of the deposition of the saw-dust made by the mills at and above the City of Ottawa, when the same is cast into the river.

Before and during the investigation I conferred with the Hon. W. J. McAlpine, with whom I have had the honor to be associated, and with whom I consulted as to the line of investigation to be pursued. The conclusions to which I have been led have been submitted to and discussed with Mr. McAlpine, who, I am happy to say, entirely concurs with me, and who will so report to you.

In considering this as a purely engineering question, the following questions naturally present themselves:

First.—What are the causes which induce the formation of bars and obstructions in navigable and other streams?

Second.—What materials usually compose such bars and obstructions?

Third.—What are the specific gravities of these materials? and

Fourth.—What velocities of current are necessary to take up and transport these materials to the point of final deposition in the bar?

Having answered the several questions, it will next be necessary to enquire in regard to the specific gravity of saturated pine saw-dust, and the velocity of current necessary to take it up and transport it.

These questions will be considered in the order in which they are stated.

CAUSES OF THE FORMATION OF BARS.

When the velocity of the current in any stream is sufficient to enable the water to scour or abrade the materials composing the bottom and sides thereof, these materials will be taken up by the moving waters, held in suspension in it, and transported down stream, until, by a widening or deepening of the channel, or both combined, the section of the stream becomes so much enlarged, and the velocity of current so much reduced, that the floating materials can no longer be held in suspension or transported.

When this occurs, a deposit takes place, which continues to increase, so long as the water arriving at the point continues to be charged with the heavy materials. In time, if this process be continued, the result is the formation of a bar, which, if

the stream be used for navigation purposes, may prove to be a serious obstruction, and one requiring removal by artificial means.

In some streams the formation of bars is a continual process; in others, bars are only formed during freshets, when the velocity of the current, ordinarily too low to effect a disturbance of the material of the bed, becomes temporarily sufficient to take up and remove large quantities of this material to deeper and wider streams lower down.

These deposits occur, not only in the channel and its immediate vicinity, but also in eddies near the margin, and in eddies formed by artificial structures, such as bridge piers and abutments, which serve not only to obstruct the free flow of the water, but to divert it from its natural course.

MATERIALS DEPOSITED IN BARS.

The materials usually deposited in bars and other obstructions to navigation are mud, coarse and fine sand and gravel, to which are sometimes added water-logged timber, chips, sticks, leaves and other detrital matter.

Generally, however, bars are principally composed of mud, sand and gravel.

SPECIFIC GRAVITIES OF THE MATERIALS.

Before giving these, it is well to note that the ultimate particles of sand and gravel may be quartz, feldspar, mica or slate, or these materials may be all combined in the same specimens of sand or gravel. Pebbles also of different kinds may be mingled with gravel. It will therefore be necessary to present the specific gravities of a considerable number of substances, in order to include all that may be found in a deposit of sand or gravel.

The following table gives the specific gravities of a sufficient number of these materials, and includes also some others which have been found in motion near the bottom of the Hudson River:—

Material.	Specific Gravity.	Material.	Specific Gravity.
Clay, in bulk	1.93	Limestone.....	3.18
Common soil, in bulk.....	1.98	Marble.....	2.70
Coal, bituminous.....	1.27	do	2.80
Coal, anthracite.....	1.44	Mica.....	2.80
do	1.64	Sand, in bulk.....	1.80
Earth, loose.....	1.50	Slate.....	2.65
Granite.....	2.62	Stone, common	2.50
do	2.70		

In regard to those materials designated in the above table as "in bulk," such as clay, common soil, loose earth and sand, it is to be remarked that the ultimate particles, except such as are of vegetable origin, are much heavier than is indicated by the tabular numbers.

The sand, for instance, being made of quartz, feldspar, mica and slate, whose specific gravities vary from, say, 2.50 to 2.80, we should not expect it to be disturbed by the same current which would take up single particles of the same magnitude, whose specific gravities were only 1.80, or equal to that of sand in bulk.

VELOCITIES OF CURRENT REQUIRED TO TAKE UP AND TRANSPORT DIFFERENT MATERIALS

Upon this subject there are many authorities; D'Hubuisson, an eminent French authority says:—"When a proper relation is established, so that the channel contains all the water brought down by the river in its great freshets without injury, it is said to have acquired *stability*, and the *regime* of the river is established."—"The velocity of the *regime* is strictly related to the species, or rather size, of the substances which form its channel." D'Hubuisson has made some experiments upon this subject of great interest

He has taken different kinds of earths, sands and stones, which he placed in succession upon the bottom of a wooden canal; by inclining it differently he has varied the velocity of the water passed through it, and has verified how much is necessary to put each substance in motion. He had for

Potter's Clay.....	0.264	feet per second.
Fine sand.....	0.5249	do
Gravel from the Seine (size of peas).....	0.6233	do
Pebbles from the sea, 1 inch in diameter...	2.732	do
Flint stones, size of hen's eggs.....	3.281	do

He then spread a bed of sand upon the bottom of the canal, and caused the water to run over it with a velocity of 0.984 feet per second.

Under these conditions the particles of sand were found to be moved forward at the rate of nineteen feet in twenty-four hours.

The velocities given are those which are just sufficient to disturb the various materials; higher velocities would be required to take up and carry off these materials.

David Stevenson, C. E., in his work on "Canal and River Engineering," page 143, gives the following as the results of experiments made by Bossuet, Du Buat and others, on the size of detrital particles, which streams flowing with different velocities are capable of carrying:—

0.25 ft. per second=	0.70	mile per hour,	will just begin to work on fine clay.
0.50	do	0.34	do will lift fine sand.
0.67	do	0.45	do will lift sand as coarse as linseed.
1.00	do	0.65	do will sweep along fine gravel.
2.00	do	1.36	do will roll along rounded pebbles 1 inch in diameter.
3.00	do	2.045	do will sweep along slippery angulated stones, size of an egg.

Lewis Gordon, Regius Professor of Civil Engineering and Mechanics, in the University of Glasgow, in his synopsis of lectures on Civil Engineering, page 16, says:—"The relation between the velocity and the quality of detritus carried along the rivers is illustrated by the following facts:—

Material Transported.	Velocity of Stream and Surface.
Fine clay and lime	0.67 feet per second.
Fine sand	1.00 do
Rough sand	1.50 do
Very fine gravel.....	2.00 do
Gravel, 1 inch diameter.....	3.00 do
Gravel, 2 inches diameter.....	5.00 do
Stones, $\frac{1}{2}$ cubic foot.....	7.00 do
Stones of 1 cubic foot	10.00 do
Stones of 2 cubic feet.....	15.00 do
Stones of 10 to 15 cubic feet	36.00 do

Prof. Julius Weisbach, in his "Mechanics and Engineering," vol. 2, page 156, says:—"A velocity of 7 to 8 inches per second is necessary to prevent deposit of slime and growth of weeds, and $1\frac{1}{2}$ ft. per second is necessary to prevent deposit of sand." "The maximum velocity of water in canals depends on the nature of the channel's bed."

On a slimy bed the velocity should not exceed.....	0.25 feet.
On a clay bed	0.50 "
On a sandy bed	1.00 "
On a gravelly bed	2.00 "
On a shingle bed	4.00 "
On a conglomerate bed	5.00 "
On a hard stone	10.00 "

This applies to the mean velocity.

The above velocities are such, as according to this eminent German authority, may be allowed, without endangering the integrity of the beds of canals (or rivers), when those beds are composed of the materials set opposite the several velocities respectively.

The velocities generally given in the preceding tables are those which are just sufficient to disturb the condition of the bottom, and in time to permanently change its character, by the slow removal of materials in some points, and its subsequent deposition at others; they are not such velocities as will produce sudden changes by the rapid removal of materials. In short, they are intended as guides to the engineers, and indicate the limits of velocity for the several materials, beyond which the current should never be permitted to run in artificial channels.

Much valuable information, bearing directly upon the case in hand, has been obtained from the charts of that portion of the Hudson River lying between the city of Troy and the village of New Baltimore, embracing a distance of about twenty miles and including all that portion of the river where troublesome bars and other impediments to navigation occur.

These charts were constructed from surveys made during the years 1867-68, under the direction of the United States Engineer Department, and for the purpose of obtaining information upon which to base plans for the permanent improvement of the navigation of the river, by the removal of the then existing obstructions, and by the adoption of measures to prevent the formation of like obstructions in the future. During the progress of the survey, attention was naturally directed to the velocity of the current of the river and to the kind and character of the materials which were being moved down stream, at and near the bottom. Careful observations were made for the purpose of obtaining reliable information upon these points. The velocity of the current was ascertained at nearly one hundred different points, and at each of these points an instrument, designated the "sand collector," was sunk to the bottom and allowed to remain there 15 minutes; after which it was removed carefully and the quantity, kind and character of the materials collected carefully noted. The results of these examinations, the officer in charge of the U. S. Engineers office in Albany, has kindly permitted me to copy from the charts in that office.

They are embraced in the following table :

OBSERVATIONS WITH "SAND COLLECTOR."

Velocity per second.	Quarter of tide.	Sounding.	Wind.	Description of deposit.
1.67 feet	2nd	9.3 feet...	1 with..	Very small quantity of sand and gravel; largest, size of a pea
1.43 do	do	10.3 do ...	do	Nothing.
1.39 do	do	13.2 do ...	do	A few pebbles; largest, size of a pea.
1.14 do	do	11.6 do ...	do	A few small pebbles.
0.83 do	do	13.6 do ...	do	Nothing.
0.67 do	3rd	12.8 do ...	2 do	do
0.91 do	do	11.0 do ...	1 do	A few small pebbles.
1.03 do	do	11.2 do ...	do	Nothing.
1.05 do	do	10.2 do ...	calm.	One small pebble and several pieces of water-logged wood.
1.39 do	do	9.3 do ...	do	Small quantity of pebbles; largest, size of a grain of coffee.
1.64 do	do	8.0 do ...	do	A few small pebbles.
1.72 do	4th	10.0 do ...	do	do
1.54 do	do	12.2 do ...	do	Nothing.
1.67 do	do	8.1 do ...	do	do
1.14 do	2nd	10.0 do ...	do	do
1.11 do	do	9.8 do ...	do	do
1.45 do	do	8.1 do ...	do	A few grains of coarse sand.
1.69 do	3rd	9.4 do ...	do	2 cubic inches of sand and gravel; largest, size of a coffee grain

OBSERVATIONS WITH "SAND COLLECTOR."

Velocity per second.	Quarter of Tide.	Sounding.	Wind.	Description of Deposit.
1.61 feet	3rd	8.2 feet...	calm.	Small quantity of coarse sand and gravel.
1.59 do	do	8.6 do ...	do	10 cubic inches of do
1.82 do	do	7.9 do ...	do	3 cubic inches of sand and gravel; largest, size of a coffee pod.
1.79 do	do	9.6 do ...	do	do
1.61 do	4th	8.7 do ...	do	Nothing.
1.67 do	do	8.7 do ...	do	2 cubic inches of fine sand.
1.82 do	do	7.4 do ...	do	Small quantity of fine sand
1.36 do	do	8.7 do ...	do	Very small quantity of fine sand.
2.00 do	3rd	20.8 do ...	do	Considerable quantity of water-logged pieces of wood and small quantity of fine sand.
1.75 do	2nd	1.90 do ...	do	do do do
1.12 do	do	18.6 do ...	do	Small quantity of very coarse sand and water-logged wood.
0.94 do	do	10.4 do ...	do	Nothing.
1.67 do	do	12.5 do ...	do	Small quantity of coarse sand and a few small pebbles.
1.61 do	3rd	9.8 do ...	do	Coarse sand and small pieces of wood and coal; largest piece of coal size of a grain of coffee.
2.08 do	2nd	12.4 do ...	do	Nothing.
1.80 do	1st	14.8 do ...	do	Small quantity of coarse sand and pebbles, size and shape of a 3 cent piece
1.67 do	3rd	11.4 do ...	do	Coarse sand, pebbles and debris of various kinds; largest pebble size of a pea.
1.79 do	1st	10.7 do ...	do	Nothing.
1.74 do	3rd	12.4 do ...	do	do
1.63 do	4th	11.2 do ...	do	Coarse sand.
1.63 do	do	10.0 do ...	do	Very small quantity of fine sand.
1.65 do	do	12.5 do ...	do	Fine sand, cinders, and coal; largest piece of coal the size of an almond.
1.00 do	1st of } T.O. }	10.4 do ...	do	{ Small quantity of fine sand and pebbles; largest pebble size of a coffee grain.
1.33 do	L.W.St.	11.4 do ...	do	Medium fine sand and small pieces of coal; largest, size of a pea.
1.41 do	4th	8.8 do ...	do	Coarse sand and very small pieces of wood.
1.59 do	do	7.7 do ...	do	Fine sand.
1.74 do	3rd	16.4 do ...	do	Fine sand and small pieces of wood, varying from 2½ inches long downwards.
1.48 do	do	15.2 do ...	do	Fine sand.
1.43 do	4th	8.3 do ...	do	Coarse sand, coal, and cinders; largest, size of a pecan nut.
1.39 do	do	13.0 do ...	do	Medium fine sand and gravel; largest, the size of a small pea.
1.48 do	do	13.4 do ...	do	Coarse sand and pebbles; largest, size of a grain of coffee.
1.08 do	L.W.St.	11.7 do ...	lagainst	Coarse sand.
1.56 do	4th	9.1 do ...	do	do and one pebble the size of ¼ of a pea.
1.49 do	do	10.6 do ...	do	Sand and gravel; largest, the size of two coffee grains.
1.48 do	do	12.5 do ...	calm.	Fine sand, water-logged chips and a few small pebbles the size of ¼ of a pea.
1.36 do	3rd	11.0 do ...	do	Very fine sand.
1.52 do	2nd	11.3 do ...	do	Fine sand and gravel; largest, the size of a split pea.
1.10 do	do	13.9 do ...	do	Very fine sand.
1.01 do	1st	19.5 do ...	do	Nothing.
1.63 do	2nd	20.2 do ...	do	Medium fine sand.
1.50 do	3rd	15.3 do ...	do	Coarse sand and small pieces of wood.
1.50 do	do	15.3 do ...	do	2 cubic inches of coarse sand and large proportion of small pieces of wood.
2.19 do	do	18.0 do ...	do	6½ inches of coarse sand and small pieces of wood.
2.21 do	do	20.3 do ...	do	6 do do do
2.36 do	4th .....	.....	do	45 do do do
2.27 do	do	13.1 feet...	do	16 do fine sand and one small shell.
2.64 do	do .....	.....	do	252 do coarse sand and pieces of wood.
2.86 do	do	12.1 feet...	do	30 do medium fine sand.
2.46 do	do .....	.....	do	18 do fine sand and small pieces of wood.
2.29 do	do	9.8 feet...	do	216 do medium fine sand and small pieces of wood.
2.26 do	L.W.St.	.....	do	54 do do and a few do

The results given in the preceding table are given in their regular order, commencing just below the State Dam in the city of Troy, and terminating at the village of New Baltimore.

An examination of this table shows that the observed velocities varied from 0.67 of a foot per second as a minimum, to 2.86 feet per second as a maximum; or from about half a mile to about 2 miles per hour; that the materials found moving at the bottom were fine and coarse sand, gravel, pebbles from the size of a quarter of a pea to the size of an almond, shells, coals, cinders, and pieces of water-logged wood; that small pebbles were found moving where the velocity of the current was as low as 0.91 of a foot per second; that the lowest velocity of current found to carry pieces of water-logged wood was 1.05 of a foot per second; pebbles as large as peas were found moving. That 1.36 feet was the lowest velocity of current in which fine sand was found; and that in no single instance within the 20 miles, was a particle of saw-dust observed among the materials brought up from the bottom.

In this connection, it is important to note that upon a small stream emptying into the Hudson, at Albany, and near its mouth, there is an extensive saw-mill; that there is a large saw-mill on Green Island, at the west end of the State Dam, and opposite to the city of Troy, and that at both of these mills the saw-dust is cast into the river.

It is also important to note that at Fort Edward, Sandy Hill, Glen's Falls, Warrensburg, each of which points is located on the Hudson River, at distances varying from 40 to 75 miles above the city of Troy, the manufacture of lumber is and has been for nearly a century carried on, the annual product for the last ten years being estimated by experts at from 150,000,000 to 200,000,000 B.M.

At all these points, the saw-dust, together with large quantities of slabs and edging, are, and have been from the beginning, cast into the river.

At Glen's Falls, water is taken from the Hudson River to feed the Champlain Canal, and in dry seasons nearly the entire flow of the river is thus diverted.

Diligent enquiry has been made of gentlemen engaged in the lumber business, of canal officials, of persons who for many years were charged with, and gave their personal attention to keeping the Champlain and the Hudson River free from obstructions to navigation, and of persons engaged in navigating the river and in transporting merchandize thereon; but I have failed to learn that bars or other obstructions to navigation, composed wholly or in part of saw-dust, have ever been formed either in the Champlain Canal or in the channel of the Hudson River. In order to find an explanation of the real or apparent absence of saw-dust in the Hudson River, I have been compelled to resort to experiment; there being no engineering authorities upon the subject of the specific gravity of saturated saw-dust, or upon the velocity of current necessary to take it up and transport it.

SPECIFIC GRAVITY OF PINE.

My experiments have been wholly confined to white pine wood, in blocks and in the condition of saw-dust, both dry and saturated with water. I have thus limited myself, for the reason that white pine constitutes the principal part, if not the entire product at the city of Ottawa, and for the reason that, upon the Hudson, for many years, little else than pine lumber was manufactured.

Blocks of white pine unseasoned have, according to different authorities, specific gravities varying from 0.46 to 0.65, depending in some degree upon the locality in which it is grown.

According to my experiments, the specific gravity of white pine, in different conditions as to dryness, is as follows:—

Unseasoned, specific gravity	=	0.466
Partly seasoned “ “	=	0.418
Dry “ “	=	0.337

It would therefore seem that this wood, when reduced to the condition of saw-dust, as well as in mass, should float upon the surface of water; but our observations

generally, as well as observations made for the specific purpose of ascertaining its behaviour in water, teach us that when unseasoned coarse pine saw-dust is placed in still water, a large portion will immediately sink, and that within three days the whole will sink to the bottom.

This is generally attributed to the fact that the finely divided wood readily absorbs water and becomes water-logged. But it is to be borne in mind that, since a particle of saw-dust, when thoroughly water soaked, is heavier than water, and since the absorbed water can be no more dense than an equivalent volume of water at any other point in the mass, the ultimate fibre of the wood must be heavier than water, else the water-soaked particle would not sink. This appears to be the case also from the fact that some of the particles sink immediately; while the wood, in its normal condition, invariably floats on the surface of the water.

I explain this apparent anomaly by saying that those particles which sink immediately are such as have been condensed by the action of the saw in cutting them from the wood, and thus reduced to less than half their original volume when in the natural state.

Having satisfied ourselves, then, that the fibre of pine wood is heavier than water, it becomes necessary to ascertain precisely how much heavier than water it is; for it is upon this fact, together with the specific gravity of the dry wood (in the block), that we must base our conclusions as to the probable behaviour of saturated saw-dust in water, as compared with that of the usual constituents of bars.

Careful experiment, undertaken for the express purpose of determining this point, shows that the specific gravity of the fibre of pine wood is 1.2624, or that the fibre is about 26 per cent. heavier than water. But the saturated particle of sawdust, consisting as it does of a bundle of these fibres with the interstices filled with water, has a still different specific gravity.

To ascertain this approximately, we take thoroughly seasoned white pine wood, assume that the mass of wood is made up of a definite volume of woody fibre of known specific gravity, and that sufficient void space is enclosed in the mass to reduce its specific gravity as a whole to what has been determined for it, viz., 0.337.

Since, then, the specific gravity of the mass is only 0.337, and that of the fibre 1.2624, it follows that only $\frac{0.337}{1.2624} = 0.267$ of the wood is made up of woody fibre, while the remainder $1.00 - 0.267 = 0.733$ of the entire volume is void of space which is capable of receiving and retaining water. We have, then, in saturated saw-dust, a compound of 0.267 of woody fibre, specific gravity 1.2624, and 0.733 of water, specific gravity 1.00.

The specific gravity of the compound, or of the saturated particle of saw-dust, is determined as follows:—

$$\begin{array}{r} 0.733 \times 1.00 = 0.733 \\ 0.267 \times 1.26 = 0.33642 \\ \hline 1.000 \qquad 1.06942 \end{array}$$

Thus it appears that, the volume of the wood remaining unchanged during the process of absorption, the specific gravity of the saturated particle will be 1.069, or about 7 per cent. heavier than that of water. But as there is always an enlargement of volume during absorption, the saturated particle will contain a larger proportion of water than we have used; and hence, the actual specific gravity of the saturated particle will be even less than 1.069.

In my opinion 1.05 will more nearly represent the specific gravity sought; indeed this is indicated by certain weights observed for other purposes during the progress of my experiments.

Whatever may be the precise specific gravity of the saturated particle, the fact is established that it is only very slightly in excess of that of water; and, hence, that the velocity of current required to lift and transport it after it has been once sunk must be very slight.

VELOCITY OF CURRENT REQUIRED.

For the purpose of ascertaining what velocity of current will take up and remove deposits of saturated saw-dust, a wooden trough was procured which was *four feet long, three inches wide, and three inches deep*. Three inches from one end of this trough a bulkhead was placed, forming a compartment of 27 cubic inches capacity for the reception of the water. The bulkhead was perforated with a large number of small holes, designed to allow the water to flow through into the trough without producing undue agitation or disturbance of the water flowing below. At the other end of the trough a weir was placed, which was finally regulated to such a height as to just discharge the water flowing in the trough when the requisite velocity had been obtained. The height of this weir, as it was finally adjusted, was one inch, and it extended entirely across the end of the trough.

The depth of the flowing stream in the trough was generally about one inch and a-half; the precise depth being, however, measured during the progress of each experiment. The trough having been carefully levelled, water was admitted into the upper compartment, from a hose attached to a hydrant, and the flow was adjusted by a cock at the hydrant. Thoroughly saturated, coarse, white pine saw-dust was then scattered into the trough in such quantity as to entirely cover the bottom, where it remained at rest.

The flow of water was then gradually increased until the particles of saw-dust manifested a decided tendency to rise and move down stream, to and over the weir. The rate of flow was such that about a teacupful of the saturated saw-dust was removed in from twenty to thirty minutes.

It is proper to remark, however, that the particles were moved slowly, at a velocity considerably less than that finally established for the experiments.

During the progress of the experiments the water discharged over the weir was repeatedly collected and weighed, and the section of the flowing stream measured.

From data thus obtained, the following velocities have been calculated for coarse saw-dust:—

1st observation, velocity	=	0.290	feet per second.
2nd	"	"	= 0.283 " "
3rd	"	"	= 0.280 " "
4th	"	"	= 0.281 " "

From which we obtain a mean of 0.2835 feet per second; or less than $\frac{1}{4}$ of a mile per hour.

At the conclusion of these observations, a very small accumulation of saw-dust remained just above the weir, which, by the way, was slowly disappearing. The flow then gradually increased to such an extent that the accumulation referred to was taken up and entirely removed in about one minute.

Under this condition of things the velocity of the current was found to be only 0.382 of a foot per second, or about $\frac{1}{4}$ of a mile per hour. At this point, then, we have established the following facts, viz.:—That a current velocity considerably less than one-fifth of a mile per hour suffices to take up and transport slowly, coarse saturated pine saw-dust; that a velocity of one-fifth of a mile per hour produces a very decided movement down stream of such particles, and that a velocity of one-fourth of a mile per hour suffices for their entire and instantaneous removal. Experiments were also made with very fine saturated saw-dust, and it was found that the decided movement of the particles was effected by a current velocity of 0.246 of a foot per second; also, that the instantaneous removal of the very small accumulation just above the weir was accomplished by a current of 0.288 feet per second, or very nearly a quarter of a mile per hour.

Thus it appears that with saturated saw-dust, as with gravel, stones, pebbles of different sizes, and other materials of nearly the same specific gravity, the velocity required to remove the particles varies with the size of those particles; in other

words, the larger the volume of the particle the greater the velocity of current required to transport it.

The accuracy of the determination in regard to coarse saw-dust was verified by other experiments with that material; as the result of which the velocity that promptly moved the particles was found to be 0.290 of a foot per second.

In the case of particles of materials of different specific gravities, but of the same size, it is clear that the force of velocity of current required to move them will vary with their specific gravities, and hence, we can readily understand why a current, which carries pieces of water-logged wood, may not be able to carry coarse sand or fine gravel stones; and why, as in the case of the observations on the Hudson River, both these materials, together with fine sand, may be found in motion at the bottom of the same place, and at the same time.

The absence of bars or accumulations of saw-dust in the channel of the Hudson River is therefore readily accounted for.

It will be remembered that the minimum velocity of current found by the U. S. Engineers between the head of navigation and the village of New Baltimore, was more than double that which we have found to be capable of transporting saturated saw-dust, (0.67 to 0.28).

From the lumber manufacturing region to the head of navigation, the fall in the river is over 100 feet, the velocity of the current must therefore be greater than that upon that portion of the river embraced in the Government surveys.

We should expect, then, that the saw-dust cast into the river would be carried down the river by the current; while the total absence of any accumulation of saw-dust in the Champlain Canal, proves that whatever refuse from the mills, at and above Glen's Falls, finds its way into it through the Glen's Falls feeder, must be carried down by its current, and be ultimately discharged, with the waters of the canal, into the Hudson River at Troy and Albany, whence it is finally carried to the sea.

That there is nothing inconsistent with this theory in the immense quantity of saw-dust annually produced on the Hudson River, may be readily shewn.

Taking the annual production of lumber on the Hudson River at 160,000,000 feet, and assuming, as we are authorized to do, that the average thickness of this lumber will not exceed $1\frac{1}{4}$ inch, and also taking the thickness of material cut out by the saw at $\frac{3}{8}$ of an inch, it appears that a cubic foot of solid wood is reduced to the condition of saw-dust for every 80 feet of lumber sawed.

In a year, then, the aggregate volume of wood reduced to saw-dust will be 160,000,000 = 2,000,000 cubic feet. At 30 pounds to 80 cubic feet, this volume of pine wood, will weigh 60,000,000 pounds or 30,000 tons.

The water-shed of the Hudson River, above Fort Edward, has been estimated by the State Engineers at 1,374,500 acres. A fair estimate of the rain-fall collected into and carried off by the river, is a volume equivalent to a depth of 20 inches of water on the entire water-shed each year. This gives for the annual flow of the river at Fort Edward, 99,788,700,000 cubic feet, whence it follows that the ratio of the volume of wood reduced to saw-dust, to the volume of water flowing in the river, is 1 to 49,894.

Assuming now that the saw-dust is uniformly distributed throughout the water, let us, in order to make the comparison more intelligible, see what volume of wood will be contained in a barrel of water. The computation shows that in a barrel of $31\frac{1}{2}$ gallons there will be just $\frac{1.46}{1000}$ of a cubic inch of wood.

By weight the relation between the wood and water is as 1 to $\frac{49,894}{0.5}$ or as 1 to 99,788 in which, for convenience, we take the specific gravity of the wood at 0.5, which is sufficiently near the truth for our purpose.

Now, in a wine gallon of water there are about 64,051 grains, whence it follows that in case of the assumed uniform distribution of the saw-dust, there would be in a wine gallon of the river water, at Fort Edward, only $\frac{64,051}{99,788} = 0.641$ of a grain of saw-dust.

At Troy, below the junction of the Mohawk River, the flow of the river is fully three times as great as it is at Fort Edward. Here, then, the relative quantity of

saw-dust is only one-third as great as at Fort Edward, or, 0.214 of a grain to the gallon.

Further down the river, as at Poughkeepsie, the flow of the river is fully four times as great as at Fort Edward, and, as a consequence of the continued dilution, the quantity of saw-dust at this point would be only 0.160 of a grain to the gallon.

Specimens of the water from the river at Poughkeepsie, taken from a point 60 feet from the surface and 10 from the bottom, have been recently analyzed by Prof. Chandler, of Columbia College. Professor Chandler's analysis shows that a wine gallon of this water contained 1.239 grain of organic and volatile matter. Croton water contained only 0.67 of a grain.

Hudson River water contained 0.373 of a grain of organic carbon to the gallon. Croton water only 0.287 of a grain.

The excess of organic and carbonaceous matter in the Hudson River water is accounted for by the saw-dust, which our experiments, together with the current observations of the United States Engineers, show may be, and undoubtedly is, carried not only to that point, but still further onward to the sea.

We can readily understand, also, in view of the very small quantity of saw-dust as compared with the flow of the river, that it may be floated downward with the water, without attracting attention, even from those directly charged with ascertaining what materials were held in suspension in the water at and near the bottom, and were being carried down by the current.

Another important fact worthy of note, as shewing that in the vicinity of Albany at least the bars and accumulations which obstruct navigation, are entirely free from saw-dust, is, that the sand used in the masonry of the Erie Canal, between Albany and Cohoes, as well as that used in the masonry of the foundations of the new State Capitol, was taken from those bars, on account of its extreme purity and freedom from organic matter.

I have been thus particular in the examination of the Hudson River, in reference to the question of saw-dust deposits, for the reason that it is in many respects a parallel case to that of the Ottawa River, and hence, that the experience on the former would serve, in some degree, to indicate what may be expected to occur on the latter.

Both are large rivers, and upon both large quantities of lumber are manufactured. Upon the Hudson, the bulk of the pine was manufactured into lumber many years ago; while now, the lumber made is principally hemlock and spruce. Upon the Ottawa, the bulk of the lumber thus far made has been from white pine.

The quantities of lumber manufactured annually on the two rivers are about the same, the product upon the Hudson being probably somewhat in excess of that upon the Ottawa. In the length of time, however, during which lumbering operations have been carried on upon the two rivers, there is a marked difference upon the Hudson; there operations have been carried on for nearly a century, and, from the best information attainable, it is probable that during that time an average of nearly 20,000 tons of saw-dust have been cast into the river annually, besides large quantities of slabs and edgings, so that the aggregate quantity of refuse from the mills, thus cast into the river, may be safely put at 2,000,000 tons. As saw-dust, this would occupy a space of about 400,000,000 cubic feet, equivalent to a cubical pile 1,000 feet square at its base, and 400 feet deep.

Upon the Ottawa, on the contrary, extensive lumbering operations were only commenced at a comparatively recent period. Again, the saw-mills upon the Hudson are more than 200 miles from its mouth, while upon the Ottawa they are less than half that distance; both are, for the most part, comparatively sluggish streams.

Thus it appears that the very question under consideration has been subjected upon the Hudson River, to a very severe practical test, covering a period of nearly a century; and yet that saw-dust obstructions in the navigable channel, or in the canal fed from the river, have never been known.

THE PENOBSCOT RIVER IN MAINE.

Sworn statements have been obtained of persons who have been engaged upon and are acquainted with the Penobscot River, in the State of Maine, which runs

through a pine timber region, upon which very extensive lumbering operations have been conducted for many years, and into the waters of which vast quantities of saw-dust and edgings are and have been cast.

These statements shew that accumulations of saw-dust alone in the channel of that river have never been known; and that no injury, impediment or obstruction to its navigation has ever resulted from the casting of saw-dust into it.

CONCLUSION.

In view of my experimental results, together with the facts observed by the United States Engineers upon the Hudson River, and in view of the experience of lumbermen and navigators upon the Hudson and Penobscot Rivers, I have formed the following, viz:—

That saturated pine saw-dust will not be permanently deposited in the water where the velocity of the current exceeds 0.25 of a foot per second, or one-sixth of a mile per hour; that water-logged chips may be deposited when the velocity of the current is less than 1.00 foot per second, or about two-thirds of a mile per hour; that saw-dust may accumulate in eddies and in still water, or where the velocity of the current is permanently less than 0.20 to 0.25 of a foot per second; that bars of sand and saw-dust, combined, will not be formed under any circumstances, for the reason that when the velocity of the current is diminished so as to permit the deposit of sand, it is still more than twice as great as is necessary to hold and transport saturated saw-dust, and, hence, that saw-dust will not accumulate or be permanently deposited in rivers where sand-bars occur, unless there exist expansions of the river, below such sand-bars, sufficient to make a cross-section, more than double that at the site of the bar; that if, in low water, saw-dust should accumulate in small quantities, the accumulated current of the first freshet would take it up and sweep it down stream; and finally, as it is extremely improbable that the minimum freshet velocity in the Ottawa River ever falls below 0.25 of a foot per second, there is no reason to anticipate the permanent formation of troublesome bars or accumulations in that river.

This opinion may be modified or strengthened when more definite and precise information shall have been obtained in relation to the magnitude of the Ottawa River, its water-shed and other characteristics.

I am, Sir, very respectfully,

D. M. GREENE,

Civil Engineer.

APPENDIX No. 3.

H. F. BRONSON, Esq.

DEAR SIR,—Since my arrival in Ottawa, I have been put in possession of such information as to the magnitude, character and habits of the Ottawa River, as will enable me to form more definite and decided opinions as to the possible effect upon navigation which may be produced by casting saw-dust into the river at this point.

I learn from a paper, signed A. J. Russell, that the extent of territory drained by the Ottawa and its tributaries above the city of Ottawa, is 43,000 square miles; that between the city of Ottawa and Grenville, the territory drained is 19,000 square miles; and that 4,000 square miles additional territory is drained below Grenville.

The total territory drained by the Ottawa and its tributaries is then as follows:—

Above the City of Ottawa.....	43,000 square miles.
“ “ Grenville	62,000 “ “
“ “ Montreal	66,000 “ “

From the same source, I learn that by the report to the Canadian Legislature of T. C. Clark, Esq., C.E., of his survey for the Ottawa Canal navigation, the mean discharge of the Ottawa, (by a series of observations) at Grenville, is 85,000 cubic feet per second; that at *low water* the discharge is 35,000 cubic feet per second; and that at *high water* the discharge is 150,000 cubic feet per second; also that the annual precipitation of rain and snow in this part of the Dominion may be safely taken at forty inches of water.

That the foregoing data are sufficiently reliable for our purpose, or that the territory drained and the rain-fall are equally in error in the same direction, (which is extremely improbable), is indicated by the relation which the mean flow of the river bears to the rain-fall. 85,000 cubic feet per second for a year represents a volume of water equivalent to 18.2 inches deep over the entire drainage territory above Grenville, or $\frac{18.2 \times 100}{40} = 45\frac{1}{2}$ per cent. of the rain-fall. This being substantially the usual estimate of engineers for the volume of water flowing in streams of this character, I feel warranted in assuming that the information furnished by Mr. Russell is reliable.

It appears, then, that the Ottawa River at the city of Ottawa is $\frac{430,000 \times 640}{1,874,500} = 20$ times as large as the Hudson at Fort Edward, and $6\frac{2}{3}$ times as large as the Hudson at Troy.

Comparing the Ottawa at Grenville with the Hudson at Troy, we find that the former is ten times as large as the latter.

It follows, then, since the minimum observed velocity at that point in the Hudson was $2\frac{1}{2}$ times that required to transport saturated saw-dust, that no deposit can occur in the channel of the Ottawa unless some point can be found where the cross-section of the river is $10 \times 2\frac{1}{2} = 25$ times as large as that of the Hudson at Troy.

Those who are acquainted with both rivers will scarcely admit the existence of such a point on the Ottawa.

In the absence of precise data as to the width and depth of the Hudson at Troy, I have been compelled to resort to the determination of velocities at various points upon the Ottawa between the cities of Ottawa and Montreal; for this purpose I have had recourse to the maps constructed from the surveys of the Ottawa River, made in 1856-7-8, under the direction of W. Shanly, C. E., facilities for the examination of which were kindly furnished by the Deputy Commissioner of Public Works.

These maps shew that between the city of Ottawa and the head of the lake above Grenville the maximum width of the river is 4,000 feet, and that its minimum width is about 1,400 feet, while the maximum depth of water recorded was 30 feet.

The maximum width of the lake referred to is about 7,600 feet, and the maximum depth of water recorded 30 feet.

Two miles above Grenville the width is 2,400 feet and the maximum depth 30 feet.

Three miles above Grenville the width is 1,800 feet, and the maximum depth 30 feet.

One mile above Grenville the width at the time of the survey was 1,200 feet, and the maximum depth 26 feet.

At Grenville the width was 1,600 feet, and the maximum depth 30 feet.

Just above Grenville, the maximum width, between banks, is about 8,000 feet; and here, in consequence of the extreme width of the river in high water, together with an abrupt change in the direction of the channel, a large sand shoal has been formed, which was bare at the time of the survey. The existence of other "sand shoals" is indicated at points further down the river. In a distance of four miles below Grenville, the maximum width is about 3,600 feet; the depth, however, is not indicated: I shall assume that it is thirty feet or over.

Below the Châte à Blondeau, in a distance of five miles, the maximum width is about 3,000 feet, and the depth will be taken at thirty feet or over. (Mr. Clarke puts it at from thirteen to thirty feet).

A careful examination of all the depths recorded upon the maps, and reference to the report of Messrs. Clarke & Shanly, satisfy me that although the depths of water sometimes exceed thirty feet, the excess cannot be great.

In order, however, to cover any possible excess over thirty feet, I shall assume in computing the sections of the river, at the various points where the widths have

been given, that the depths given and assumed are the *average* depths of the sections.

It will be seen that while I shall thus obtain sectional areas largely in excess of the true areas, where the soundings were frequent, and the maximum depth of water definitely ascertained, I shall provide for a large margin for safety, wherever there is any uncertainty as to the maximum depth of water. In this manner I shall obtain velocities which, if they vary in either direction, will fall below the actual velocities.

APPROXIMATE SECTIONS AND VELOCITIES AT LOW WATER.

By the process indicated above, I find the maximum cross-section, and the minimum mean velocity, between the city of Ottawa and the head of Lake Original, to be 120,000 square feet, and 0.30 of a foot per second respectively, while the minimum section and the maximum velocity are 42,000 square feet and 0.83 of a foot per second respectively.

In Lake Original the maximum section and the minimum velocity are 228,000 square feet, and 0.154 of a foot per second respectively.

At a point four miles above Grenville the section and velocity are 96,000 square feet, and 0.37 of a foot per second respectively.

Three miles above Grenville the section and velocity are 54,000 square feet, and 0.65 of a foot per second respectively.

Two miles above Grenville the section and velocity are 72,000 square feet, and 0.50 of a foot per second respectively.

One mile above Grenville the section and velocity are 31,200 square feet, and 1.12 feet per second respectively.

At Grenville the section and velocity are 48,000 square feet, and 0.73 of a foot per second.

In a distance of four miles below Grenville the maximum section and the minimum velocity are 108,000 square feet, and 0.32 of a foot per second respectively.

In a distance of five miles below the Châte à Blondeau the maximum section and the minimum velocity are 90,000 square feet, and 0.39 of a foot per second respectively.

In Lake of Two Mountains the maximum section and the minimum velocity, by the process adopted, appear to be 315,000 square feet, and 0.11 of a foot per second respectively; but here, as in Lake Original, our section, judging from Mr. Clarke's statement in regard to depth of water and the natural formation of the bed in such cases, is much larger than the actual section, and our velocity as much too small. Half the section found, and double the velocity, would, in my judgment, more nearly accord with the actual section and velocity.

However, we will let the results stand as we have found them, and proceed to the determination of the approximate velocities at high water.

APPROXIMATE VELOCITIES AT HIGH WATER.

The volume of water flowing into the Ottawa River, at Grenville, at high water, is about four times as great as that flowing in time of low water; more accurately it is $\frac{150000}{35000} = 4.29$ times as great.

Taking now the average depth between the city of Ottawa and Grenville, at high water, at fifty per cent greater than that at low water, the sections will also be fifty per cent. greater in high water than they are in low water.

The minimum velocity then between Ottawa and Grenville, in high water, will be $\frac{4.29}{1.5} \times 0.37 = 1.06$ feet per second; a velocity sufficient to carry small gravel stones, and four times as great as that required to take up and transport saturated pine sawdust.

In the widest portion of Lake Original, the velocity will be $\frac{4.29}{1.5} \times 0.154 = 0.44$ of a foot per second, or more than 50 per cent more than is required to move sawdust, and sufficient to move fine sand.

Below Grenville, taking the depth at high water at 40 per cent greater than at low water, the minimum velocity in a distance of 4 miles will be $\frac{1}{4} \times 0.39 = 1.20$ feet per second.

In the Lake of Two Mountains, taking the depth at high water at 30 per cent. greater than that at low water, the minimum velocity will be $\frac{3}{4} \times 0.11 = 0.34$ of a foot per second, or more than 20 per cent greater than that required to move saturated pine saw-dust.

That the velocities which we have thus deduced are none too high, but that they are in all probability much too low, especially in Lake Original and in Lake of Two Mountains, by the fact that "sand shoals" occur below these points, which could not have been formed had not the velocities above them been at least 0.50 to 0.60 of a foot per second, or sufficient to have taken up and transported the sand to the point of its final deposition.

The current which was capable of doing this, was still able, after a reduction of velocity, which permitted the deposit of the sand to sweep the saw-dust forward and into the more rapid currents below, which would hurry it on with varying speed until the waters of the Ottawa mingle with those of the St. Lawrence at Montreal.

Thus it appears that while it is barely possible (though altogether improbable) that in extreme low water slight deposits of saw-dust may accumulate in the deep water in Lake Original and in Lake of Two Mountains, the first succeeding high water would inevitably sweep such possible accumulations forward to the St. Lawrence.

As a matter of curiosity, suppose we admit that no saw-dust is carried below Grenville, or that it is wholly deposited in Lake Original, and ascertain, if possible, what the result would be at the end of a century.

Taking the annual manufacture of lumber at the city of Ottawa at 16,000,000 feet B.M., and assuming, as we have already shewn, that a cubic foot of solid wood is reduced to the condition of sawdust for every 80 feet of lumber sawed, we get for the volume of wood annually reduced to sawdust $\frac{16,000,000}{80} = 2,000,000$ cubic feet.

This, as saw-dust, would make 6,000,000 cubic feet annually. Then in a century, the accumulation would be 600,000,000 cubic feet.

The length of lake is about 6 miles; if, then, we assume that this mass of saw-dust is spread over a portion of the river bed 6 miles long and 4,000 feet average width, the depth of the accumulation would be only $\frac{600,000,000}{160,000 \times 6,280} = 4.74$ feet deep and would reduce the depth from 30 feet to 25.26 feet.

If the width of the accumulation be assumed at only 2,000 feet, (maximum width of the lake is 7,600 feet), the depth of the accumulation would be 9.48 feet and the effective depth of the channel would be reduced to from 30 to 20.52 feet.

If this process of accumulation were to go on, the section of the stream would be gradually reduced, and the velocity increased, until at length it would become sufficiently great to carry down not only saw-dust but heavier material as well.

A channel 2,000 feet wide and having an average depth of $17\frac{1}{2}$ feet, is required to discharge the minimum flow of the river at Grenville with a mean velocity. If the average depth remained constant, and the width be reduced to 1,600 feet, the requisite mean velocity would be 2.00 feet per second.

Thus, in this view of the case, it appears that a serious obstruction to the navigation of the river, as the result of the floating and subsequent deposition of loose material, would be next to impossible—except at such points as, on account of great width of section, afforded the requisite cross-section with a depth less than that required for the purposes of navigation.

Samples of materials, six in number, taken from the shoal places between the city of Ottawa and Grenville, have been shewn me. These materials are wholly composed of pure, clean sand of different degrees of fineness. Not the slightest indication of the presence of saw-dust can be detected in any of the samples, even when examined under a glass.

As the result of this further investigation, together with the examinations I have made of the materials taken from the shoals in the Ottawa River, the opinions

which I expressed in my former communication are not only confirmed, but are very materially strengthened; and I now feel no hesitation in expressing the opinion that saw-dust obstructions have not thus far been formed in the channel of the Ottawa River, and that there is no reason whatever to apprehend the formation of such obstructions in the future.

I am, Sir,

Very respectfully,

D. M. GREENE,

Civil Engineer.

Ottawa, Ontario,
March 10th, 1871.

APPENDIX No. 4.

William J. McAlpine, of the City of Albany, State of New York, being duly sworn, deposeth and says,—That he is a Civil Engineer, and has been practising as such for the last forty-five years; and, from eighteen hundred and thirty-four to eighteen hundred and fifty-four, on the eastern division of the Canals of New York, embracing the Champlain and Glen's Falls Feeder Canal, in the capacity of Resident Chief and State Engineer.

That he has had charge of the enlargement of the Glens' Falls Feeder, and the reconstruction of its locks, and also of the Champlain Canal, and (during his term of office as State Engineer) of the removal of the Castleton bar on the Hudson River, about six miles below Albany.

That while in the State Service, he has had occasion to pass over the Champlain Canal and Feeder almost every spring, during the time that the workmen were engaged in removing the deposits from the bottom of these canals, the character of which deposits he has carefully noted. That he has been familiar with the traffic upon the said canals for the period above mentioned, and also with the vast amount of lumber manufactured on the Hudson River above, at, and below the said Feeder Canal.

That in the removal of these deposits from the said canals, he has never seen or heard of any accumulation of saw-dust in any part or place in the channels of these canals, and has never heard of any complaint having been made of any such obstruction to the navigation of the Hudson River above Glen's Falls, nor below Fort Edward, (the river between those two places being an almost continuous rapid.)

That during the removal of the Castleton bar, by the direction of the Legislature in eighteen hundred and fifty-two, he has had occasion to frequently visit and examine the material excavated, and never observed, or heard of, any deposits of saw-dust at that place, but that he has seen so removed sunken logs and decayed wood.

He further deposes and says that much of the sand used for the masonry of the enlargement of the Erie Canal, between Cohoes and Albany, was (by his direction) taken from the Hudson River bars, in consequence of its great purity and entire freedom from woody or organic matter, and more recently, viz., in eighteen hundred and sixty-nine, he directed that the sand for the twenty-five thousand cubic yards of masonry in the foundations of the new Capitol at Albany should be taken from the sand bars in the said river, opposite and below that city, for the reasons first above stated.

That he has had occasion to examine the deposits made upon many other rivers in the United States where large lumbering operations were carried on, as on the Delaware, Susquehanna, those in the State of Maine, and some in the Western States, and that he has never seen or heard of any obstruction or impediment to navigation on those rivers from the deposition of saw-dust.

That he believes from the inferior weight of long water-saturated saw-dust to that of even the finest sand, the former will always be moved ~~removed~~ by a current

which will just begin to deposit the latter, and, hence, that the two would rarely be deposited in the same place, and never on a bar where there is a current of more than one-fifth of a mile an hour; and in a running stream it will only be deposited where there is almost no current, such as in eddies or in very wide expanses of the stream; and even if it should happen to be left in any regular navigable channel, it would, of itself, form almost no obstruction to a vessel, which would only stir it up and then it would be floated forward and deposited in another place, where it would do no injury to the navigation. And further, this deponent sayeth not.

W. J. McALPINE.

United States of America.

Commonwealth of Massachusetts, Berkshire, S.S.

16th February, 1871.

Subscribed and sworn to before Mr. Edgar W. Wood.

Commission of the Circuit Court of the United States.

APPENDIX No. 5.

ALBANY, March 1st, 1871.

To H. Bronson, Esq., Ottawa.

DEAR SIR,—Professor D. M. Greene and myself have discussed the question which you have presented to us, viz.: The effect upon the navigation of the Ottawa River of discharging therein the saw-dust from the manufactures at and above Ottawa.

With this you will receive an exhaustive and elaborate report upon the subject from Professor Greene, which I have carefully examined and discussed with him; and as I entirely concur therein, I will only state the leading points and will add thereto the results of my own observation and experience in regard to this subject.

As there is no engineering authority which furnishes the specific gravity of saturated saw-dust, or of the velocity of the current required to remove it, Professor Greene has been compelled to resort to direct experiment to determine these two points, both of which are necessary to the solution of the question involved. The results of his experiments are that the specific gravity of water-saturated saw-dust (or of its weight compared with water) is 1.05+. The velocity necessary to move coarse saturated white pine saw-dust, lying on a smooth bottom of a stream, is 0.282 feet per second, equal to about one-fifth of a mile per hour, and of pine saw-dust is 0.246 feet per second, or about one-sixth of a mile an hour.

The United States Government engineers ascertained that the sand and even small gravel stones in the Hudson River, near Albany, were moved along the bottom by velocities of 1.4 to 1.7 feet per second, and in a few cases with those of even one foot velocity.

Other standard authorities agree substantially with these results.

The specific gravity of the individual particles of the Hudson River sand is from 2.25 to 2.66, as they may happen to be of slate, mica, feldspar or quartz.

As sand or fine gravel, with a specific gravity of, say, 1.5 feet per second, these experiments and authorities show that Professor Greene's results may be relied upon as substantially correct, as applicable to the case in hand, and therefore that no permanent deposit of saw-dust will take place where the velocity of the current exceeds 0.25 feet per second.

The mean annual volume of the saw-dust cast into the Hudson is but one hundred thousandth part of the volume of the water passing at Albany, or about half a grain to the gallon, while it is well known that a portion of such saw-dust is deposited above low water mark and is decomposed, all of the remainder (except that which is not deposited in the shallow side basins) is undoubtedly carried forward to the sea.

Analysis of the water from the very deep places toward the mouth of the Hudson, show the presence of even larger quantities of material of this character, and therefore that this saw-dust is carried thus far seaward, and a similar analysis would doubtless shew its presence at the mouth of the river.

That the velocity of water in the Ottawa River generally exceeds that required to move saw-dust forward, is evident from the well-known fact that the bars in the wide expansions of the river are composed of clay, sand and gravel, all of which required a much greater velocity to transport them to these places, and whenever this velocity was lessened enough to permit of the deposition of these materials, it still greatly exceeded that necessary to carry the saw-dust onward.

If a deposition of saw-dust should happen to be made in the channel, its small excessive weight compared with that of the water would render it almost no impediment to the first vessel which passed, and that would clear the channel for the next one, while the first freshet in the river would doubtless entirely sweep it out.

A considerable portion of the saw-dust which is thrown into the stream will doubtless accumulate in the side bays of still water, and sometimes, perhaps temporarily in parts of the channel where previous obstructions have been produced by logs, brush, slabs, leaves, sand, etc., but in these cases, it will again be removed by the first freshet.

I have not examined the navigable channel of the Ottawa with reference to this particular question, and have therefore based my opinion upon my observations, for many years, of the Upper and Lower Hudson, the Delaware, and Susquehanna, the rivers in the State of Maine, and those in some of the Western States, where very large saw-mills have been in use for many years.

In all of these cases, I have never observed, nor heard of complaints made of any obstruction or impediment to the navigation, by vessels or floats, from the deposition of saw-dust.

The present investigation satisfactorily explains why no such deposits or obstructions to the navigation of those rivers have occurred.

Respectfully yours,

WM. J. McALPINE.

APPENDIX No. 6.

STATE OF NEW YORK, }
Rensselaer County. }

Thomas McManus being duly sworn, deposes and says:—That he resides in the city of Troy, and is the senior member of "The Hudson River Transportation Company," whose offices are at No. 191 River street, in said city, and the business of said Company consists in the transportation of merchandize upon barges and otherwise in the Hudson River between the cities of New York and Troy and intermediate points.

Deponent further says: that he has been acquainted with the said Hudson River and its navigation for the period of twenty-five years, and that he has been actively engaged in the navigation thereof for the twenty-three years last past.

Deponent further says: that he has been an alderman of said city of Troy; that during the time he served as such alderman, he was Chairman of the Committee on Navigation, the chief duty of which was to keep the Hudson River in navigable condition, within the limits of the said city; that said Committee had charge of the city dredge; and also had control of its operations.

Deponent further says: that he has a large acquaintance with persons engaged in the navigation of the said Hudson River; and that such acquaintance, together with his own personal experience and observation, have afforded him unusual facilities for knowing the location, magnitude and character of the bars and other obstructions to navigation in said Hudson River, and of the kind of material of which they are and

have been composed. Deponent further says: that said obstructions and bars are caused by the deposit or accumulation of sand and gravel, together with sunken logs and pieces of timber, the latter being, in deponent's opinion, an active primary cause of those obstructions which contain them. Deponent has never seen or heard of any obstructions or impediments to navigation which were caused by the deposit or accumulation of saw-dust alone; nor had he ever heard of any complaint or objection having been made that saw-dust cast into the river, from saw-mills on its banks or elsewhere, become deposited in bars, or that it had a tendency to be so deposited, or that it injured or impeded navigation in any manner whatever.

Deponent further says: that he does not believe that saw-dust alone has been or will be deposited, or that it will accumulate on the bottom of a channel of a navigable river like the Hudson to such an extent and of such consistency as to produce any impediment or obstruction to the free navigation of such river.

F. McMANUS.

Subscribed and sworn to, before me, this }
18th day of February, 1871. }

D. M. GREENE,
Commissioner of Deeds.

APPENDIX No. 7.

STATE OF NEW YORK, }
Warren County. }

Jeremiah W. Finch being duly sworn, deposeseth and saith:—That he resides in Glen's Falls, in said county, is President of the Glen's Falls National Bank, and is engaged in the business of manufacturing lumber, and has been for twenty years on the Hudson River, and is now part owner of three large saw-mills on the said river, and is familiar with the business of manufacturing lumber in all its branches, from the cutting the timber on the stump to the sale of the lumber in the market.

That the firm of which deponent is a member transports most of the lumber they manufacture to the cities of Brooklyn, New York and other places intermediate, Glen's Falls and New York.

Deponent further says: That most of the lumber has been cut off the Hudson River proper, and the principal part is now obtained from the tributaries of said river, and much of it from quite small brooks and creeks, and so small that the timber can only be floated out by means of dams, ponds and artificial flooding, the effect of which is to wash the banks of the streams very much, and thereby fill the waters with much earth, which is carried down into the main stream, and some of it into the canal, and which gradually settles and is deposited on the banks and bed of said river and canal. That all or nearly all the mills cast more or less edgings and other refuse into the river, as well as saw-dust. That in the eddies of the river the edgings have in some few instances lodged, and by means thereof saw-dust, sand and other deposit collected and settled around, between and upon them, but that no accumulations have formed in the *channel* of the river, and that the saw-dust alone does not and will not accumulate or form any obstruction to navigation whatever; that deponent has never heard or known of any collection or accumulation of sawdust alone in the canal or Hudson River, nor of any accumulation or collection of edgings with saw-dust and earth that was an obstruction, or which impeded or impaired the navigation of said river or canal. That no one in this community, so far as deponent knows or has ever heard, claims or has ever claimed that sawdust made by the saw-mills was injurious to navigation, or tended to injure the same either in the canal or river, nor has any objection been made to saw-dust being discharged into the river so far as deponent knows or has any information or belief. Deponent further says: that upon his information he firmly believes that sawed lumber has been manufactured on the

Hudson River for the last 75 to 100 years; that deponent's belief is founded as well upon the general statements, traditions and history of this portion of the country, as the fact that some of the ancient title deeds, forming a link in the chain of the title of some of deponent's mill property, and which were made in the seventeenth century, recognizing then existing saw-mills and defining the rights and privileges of the same respectively, as well as to the use of water and other rights in common as the boundaries of the mill sites. Deponent further says: that Glen's Falls is located on the Hudson River, about fifty miles above Troy and Albany; and also in deponent's opinion and belief, that for the last ten years there has been manufactured on said river, on an average, annually, not less than from one hundred and fifty to one hundred and seventy-five millions of feet of sawed lumber, and before that time not quite as much.

J. W. FINCH.

Subscribed and sworn to before me, this }
11th day of February, 1871.

S. BROWN,
County Judge of Warren County.

APPENDIX No. 8.

City of Ottawa, Province of Ontario, }
Canada.

Levi Young, of the city of Ottawa, being duly sworn, deposes and says: That he is acquainted with the *character* of the Penobscot River, in the State of Maine; that he was engaged in navigating said river and in attending booms upon it from 1832 to the year 1854; that during that period he enjoyed every facility for learning the capacity of said river and for making himself familiar with the business transacted upon it. Deponent further says, that said river runs through an extensive pine region; that for many years the timber of this region has been sawed into lumber upon the banks of said river, and that the sawdust has been cast into the said river. Deponent further says, that he never saw any deposit of saw-dust in the *channel* of said river, and that he never heard of any bars or obstructions to navigation of any kind resulting from the deposition of saw-dust. Deponent further deposes and says, that when large quantities of slabs and edgings are cast into a stream with saw-dust, and especially where shoals and eddies occur, bars or accumulations may occur, but that his experience with navigable streams and in the manufacture of lumber on such streams has taught him, and that he verily believes, that saw-dust alone has not been and will not be deposited in such a manner as to obstruct or impede navigation, or to obstruct the ordinary flow of the water.

LEVI YOUNG.

Sworn before me, at Ottawa, this 20th day }
of February, 1871.

GEO. HAY, J. P.

APPENDIX No. 9.

STATE OF NEW YORK, }
Rensselaer County.

Henry Swally, being duly sworn, deposes and says: That he is a resident of the city of Troy, in said county; that said city of Troy is located upon the Hudson River,

about fifty miles below the village of Glen's Falls, in the County of Warren, in said State, and about one hundred and fifty miles above the city of New York, and that large volumes of the waters of the Erie and Champlain Canals, together with the sediment therein contained, are deposited in said Hudson River, within the limits of the said city of Troy.

Deponent further deposes and says, that he has been familiar with and has been engaged in navigating said Hudson River for the period of sixty years; that from 1849 to 1870, a period of about twenty years, he was employed as captain of Troy City Dredge. That while so employed, he had occasion to remove from the channel of the said Hudson River, within the limits of the said city of Troy, all deposits tending to obstruct or impede the navigation of the same; that he personally saw and knew the character of the materials dredged from the channel of said river within the limits aforesaid, and that said materials so removed consisted almost exclusively of mud, sand and gravel.

Deponent further deposes and says, that he never saw or heard of any deposit or accumulation of saw-dust in the channel of said Hudson River which did or could, in his opinion, obstruct or impede navigation in the same, and that he never heard of any complaint from persons engaged in navigating said Hudson River, that their business had been or was in any way injured or affected by deposit or accumulation of saw-dust. Deponent further deposes and says, that he has seen in still water and eddies such accumulations of saw-dust which were held by accumulations of water-logged timber, leaves and other debris previously formed, and which served as a nucleus or bar for the retention of said saw-dust, but that in every instance these accumulations of saw-dust as aforesaid were of a semi-fluid character, and so nearly of the same specific gravity as water, as to yield to the slightest disturbing cause.

Deponent further deposes and says, that in his opinion saw-dust alone will not and cannot accumulate in the channel of a navigable river in such masses or of such density as to prevent, obstruct or impede the navigation of the same.

Deponent further says that the effect of the tide is felt at the said city of Troy, the rise and fall of the water in said Hudson River, at the said city of Troy, as the direct result of the tides, being from twelve to twenty-four inches daily.

H. SWALLY.

Subscribed and sworn to before me, this }
11th day of February, 1871. }

D. M. GREENE,
Comr. of Deeds.

APPENDIX No. 10.

Mr. D. M. GREENE, C. E., Troy, N. Y.

MY DEAR SIR,—Your letter of the 10th inst. reached me yesterday, having been forwarded from Oswego, which place I left, to avail myself of a short leave of absence on the 9th inst.

In reply to your question, I beg to state that the subject of saw-dust in the river was never brought to my attention, from the fact that many of the mills along the Hudson made use of their dust as fuel. I was on duty upon the Hudson River improvement for over four years, and during that time we excavated over 500,000 cub. yard of mud, ashes, cinders, etc., from the channel, and while there may have been saw dust present, and it might have been noticed by others, I never saw any myself.

Trusting that this information may be of benefit to you, although it amounts to but little.

I am, yours very truly,

JOHN M. WILSON,

Managing Engineer, Brevet-Col. U. S. A.

APPENDIX No. 11

STATE OF NEW YORK, }
Warren County. }

John Keenan, being duly sworn, says :—That he resides in Glen's Falls, in said county, and has known the Hudson River and Champlain Feeder Canal since 1832 ; that deponent is senior co-partner of the Joint Line Company and President of the Glen's Fall Transportation Company, which runs boats from Glen's Falls to Troy, Albany, New York, and other places ; that deponent and his co-partners have done work by the job on said canal in deepening and enlarging the same, and deponent has been familiar with the navigation and condition of said canal since the year 1832. That in the summer season, when the water is lowest in said river, the Feeder Canal draws the whole volume of water from the river, so that the channel of the river is practically turned into the canal during such period of low water ; that deponent has never known or heard of any saw-dust collecting or accumulating in any part or portion of said canal. That deponent has repeatedly seen the workmen engaged at various times cleaning the sediment out of the canal, but has never seen any saw-dust among it ; that deponent has never known or heard of any injury arising from saw-dust in the river or canal to the navigation thereof. That the parties engaged in the navigation on said river and canal have not considered and do not consider that the saw-dust from the saw-mills do any injury to navigation whatever ; so far as deponent has any knowledge or belief, parties engaged in navigation have never made any objection, and do not object to saw-dust being cast in the river.

JOHN KEENAN.

Subscribed and sworn to before me, this 31st }
day of January, 1871. }

S. BROWN,
County Judge of Warren County.

APPENDIX No. 12.

STATE OF NEW YORK, } (S.S.)
Warren County. }

David Underwood, being duly sworn, says :—That he resides in Fort Edward, Washington County, New York, and has represented his district in the Legislature of the State of New York. Deponent further says, that he is a saw-mill owner and manufacturer of lumber on the Hudson River, and has been practically engaged in the business for the last 29 years ; that deponent's mills are located at Fort Edward, about six miles below Glen's Falls ; that in deponent's judgment and belief there have been 200,000,000 feet of sawed lumber, at least, manufactured annually on the Hudson River and on an average during the past ten years.

That deponent has been acquainted with the Hudson River, the business thereon, and navigation thereof, for almost 40 years ; and in deponent's judgement and opinion, for the 30 years next preceding the last ten years, there was sawed lumber manufactured on said Hudson River, annually, on an average from 125,000,000 to 150,000,000 feet of lumber ; that formerly the timber manufactured into lumber on the Hudson River was mostly white pine, but lately it is mostly spruce and hemlock ; that in deponent's belief the average thickness of lumber cut on the said river during the time aforesaid does not exceed one inch and one-eighth of an inch in thickness ; that deponent has never heard or known any complaint, trouble or inconvenience arising from saw-dust to navigation on the Hudson River and in the canal ; that, from deponent's position and business, deponent thinks it impossible that any

obstruction or inconvenience could have occurred from saw-dust without deponent having known or heard of it.

DAVID UNDERWOOD.

Subscribed and sworn to before me, this }
 31st day of January, 1871, }
 S. BROWN. }

APPENDIX No. 13.

STATE OF NEW YORK, }
 Warren County. } (S.S.)

Honourable Joseph Russell, being duly sworn, says :—That at present he resides in Glen's Falls, and until lately resided in Warrensburgh, in said county, and which place is also located upon the Hudson River; that deponent has been actually engaged in the business of manufacturing sawed lumber for the last 50 years on the Hudson River, except that deponent's lumber business for the last ten years or about that time has been elsewhere, and not on said river. That deponent commenced lumbering about 50 years ago on the east branch of the Hudson River six miles above Warrensburgh. That at that time, in deponent's opinion and belief, there were 75,000,000 feet of sawed lumber and upwards manufactured annually on the Hudson River and its tributaries, and that the manufacture of sawed lumber has been gradually increasing on said river and its tributaries, exceeds 200,000,000, and in deponent's opinion and belief will average annually at least from 175,000,000 to 200,000,000 for the last ten years. That when deponent first commenced lumbering on the river, not only edgings but more or less slabs were thrown in the river, and the whole waste aside from the saw-dust was at least four times as much as at present. That the change or diminution of waste thrown in the rivers has been caused by the increased value of the material and the improvement in mills and machinery. That there has never been any restriction, by public law or otherwise, so far as deponent has any knowledge or information, upon the mill owners and manufacturers casting into the rivers as much refuse stuff as they chose; but on the contrary they have always disposed of the refuse stuff, including saw-dust, as their convenience and interest required, and generally by casting the same into the river. That deponent has never known or heard of any obstruction or injury to the navigation of said river or the canal, by reason of the saw-dust and refuse stuff cast in the river, nor has deponent ever known or heard of any obstruction being made to such refuse stuff being cast into the river. Deponent further says that he represented this district in the Congress of the United States, two terms of two years each. Deponent was first elected in 1844, and the last time in 1850.

JOSEPH RUSSELL.

Subscribed and sworn to before me, on }
 this 1st day of July, 1871. }
 S. BROWN,

County Judge of Warren County.

APPENDIX No. 14.

POTSDAM, NEW YORK, 22nd February, 1871.

Professor D^rM. GREENE.

DEAR SIR,—The writer is surviving partner of the late firm of G. & S. T. Richards, who were up to a recent time engaged in the lumber manufacturing business,

and operated mills, propelled by water power, on the Schroon or east branch of the Hudson River, which is the main branch of that river above the Mohawk. In common with all the other mills on the Hudson and Schroon Rivers, the saw-dust made at our mill was always dropped into the river, and carried down the streams by the water. The firm of G. & S. T. Richards commenced such business in the year 1848, and continued in it to and including the year 1869, during all of which time they were acquainted with the other parties doing a similar business on such river and it was known that the mills disposed of their saw-dust in the manner above mentioned; and during all of which time the said firm of G. & S. T. Richards put their slabs, edgings and buttings, as well as saw-dust, into the river. The lumber manufactured by us was mainly put on canal boats at Glen's Falls, and transported through the Champlain Canal to Troy and Albany, and other markets below those points on the Hudson River.

The mills aforesaid of G. & S. T. Richards manufactured on an average one and three-quarters millions feet, board measure, of pine, spruce, hemlock, and bass and ash, and some other kinds of lumber. Our mill was located six miles above the village of Warrensburgh, (over twelve miles by the river, which has very little fall for that distance), to which place we moved our lumber by rafting or running down the river. We were never troubled in the least by the presence or accumulation of saw-dust in the river or canal, in transporting our lumber to market. Soon after the building of the large leather tanneries on the river and branches above our mill, we had considerable fears that the accumulation of exhaust ground tan-bark, large quantities of which were thrown into the river above us, might seriously interfere with the navigation of the river. In fact, the tan-bark was our greatest danger; but it was found that the spring freshets had the effect to throw the bark and saw-dust into bars above ordinary water, where, after the bars got dried out, the owners of the land burned the accumulations, and got a very good manure for their lands.

In the opinion of the writer, founded on his experience in the business, no danger need be apprehended of the obstruction of the navigation of a river, on account of the accumulation of saw-dust thrown into it.

Respectfully

GEO. RICHARDS.

APPENDIX No. 15.

GLEN'S FALLS, NEW YORK, 1st February, 1871.

To the Hon. the Commissioner of Public Works
of the Province of Ontario.

Since January, 1832, I have resided at this place. I was a member of the Bar until 1857, and since then have been a Justice of the Supreme Court. During all this time I have been familiar with the lumbermen upon the Hudson River, and have observed their mode of operations in the manufacturing of lumber from the village of Warrensburgh, a distance of about thirty-five miles by the course of the stream above Glen's Falls, to Fort Millac, about eighteen miles below Glen's Falls. For twenty years I was counsel to parties owning water power at this place, in actions relating to such water power.

I have read the affidavit of Augustus Sherman in relation to the quantity of lumber manufactured at different points upon the Hudson River for fifty years last past, and I concur with him in his statement so far as it relates to the time that I have resided here.

All the mills at which lumber has been manufactured have been operated by water, and have discharged their saw-dust and edgings into the stream. During the season of low water in the summer the principal part of the water in the river is required, and is used, for canal navigation through the Glen's Falls Feeder, the

head of which is a mile and a-half above Glen's Falls. During the whole time that I have resided here, I have never observed that any obstruction to navigation or to the use of the Hudson River for *floating logs* or for water power has been occasioned by the discharge of saw-dust and edgings from saw-mills into the stream; nor have I ever heard any objection made or of objection being made to such use of the stream--nor have I ever heard any complaint made by navigators of the canals, or by those interested in the navigation, or by officers having the same in charge, that the saw-dust or edgings from the saw mills above the feeder dam have had any tendency to obstruct the use or to diminish the supply of water in the canal.

I write this statement at the request of my friend Mr. H. F. Bronson, of Ottawa.

Respectfully

E. H. ROSEKRAN,

Justice of the Supreme Court.

APPENDIX No. 16.

STATE OF NEW YORK, } (S.S.)
Rensselaer County.

Daniel H. Sullivan, being duly sworn, deposes and says. That he resides in the city of Troy; that he has been acquainted with the Hudson River and its navigation for twenty-eight years; that he had been engaged in the navigation of the said river in various capacities during the greater part of that period, and that he is now and has been for fourteen years the Superintendent of the Hudson River Transportation Company. Deponent further says that the offices of the said Company are located in the said city of Troy, and that its business consists in the transportation of merchandise upon barges or otherwise upon said line between the cities of New York and Troy, and intermediate points. That during the time deponent has been employed on said line, and especially during the time he has acted in the capacity of superintendent as aforesaid, he has been personally familiar with the location, magnitude and character of the bars and other obstructions to navigation which have from time to time being formed in said river, and has observed the kind of materials of which they were formed in said river and that said materials were mud, sand and gravel, together with oak logs or hardwood sticks, but that deponent never saw pine logs removed from said bars. Deponent further says, that he never saw any deposit or accumulation of saw-dust in the channel of said river, and that he never experienced any difficulty or met with any obstruction or impediment in the navigation thereof which was caused by saw-dust. Deponent further says that he has a large acquaintance among persons engaged in the navigation of said Hudson River, and that in his intercourse with such persons so engaged he has never heard of any bars, deposit or accumulation of saw-dust in the channel thereof which interfered with or impeded navigation in the least; nor has deponent ever heard of any complaint or objections having been made to the casting of saw-dust into said river, that it obstructed or impeded, or that it had a tendency to obstruct or impede navigation, or that it was objectionable in any way whatever. Deponent further says, that he was for six years employed in a shipyard at the village of Athens; that said village of Athens is situated on the west bank of the Hudson River, about twenty-five miles below the city of Albany, and about thirty-one miles from the city of Troy; that in the said shipyard the saw mill was located over a small bay where there was no perceptible motion of water, except such currents as were by the tides, and where the bottom was of soft mud; that the saw-dust from said mill was deposited into the water of said bay; that there was never, so far as deponent knows, any accumulation of saw-dust upon the bottom of the river at that point, but that the saw-dust so deposited or cast into the river was floated off, and, as deponent verily believes, was carried by the current to the sea. Finally, deponent says, that in his opinion (which is based upon

his experience and observation upon the said Hudson River) saw-dust when cast into a navigable river like the Hudson, in such quantities and at such rates as it would naturally be produced in the manufacture of lumber, will not produce bars or obstructions to navigation in the channel thereof.

DANIEL SULLIVAN.

Subscribed and sworn to before me this }
17th day of February, 1871. }

D. M. GREENE,

Comr. of Deeds.

APPENDIX No. 17.

STATE OF NEW YORK. }
County of Warren. }

Augustus Sherman, being sworn, says: That he resides in Glen's Falls, in said county, and is engaged practically in the business of manufacturing lumber on the Hudson River, about fifty miles above the Cities of Troy and Albany, and has been so engaged in said business for the last forty-five years and upwards. That during said time deponent has been the owner or lessee of one or more saw-mills, run and operated by deponent in said business. That deponent owns timber lands on said river and its tributaries, and has cut the timber therefrom, manufactured the same into lumber and transported the same to Troy, Albany, and other markets, and is well acquainted with the Hudson River, its size, capacity, channel and currents, as well between Glen's Falls aforesaid, and Troy and Albany, as above Glen's Falls. Deponent is also well acquainted with the different saw-mills on said river, and their capacity. That the principal part of the lumber manufactured by deponent has been manufactured by the mills known as the Sherman mills, and the Swartrout mill, (the latter leased by deponent), which are situated on said river about one mile, and one half a mile above Glen's Falls aforesaid.

That during the last ten years, deponent has manufactured at said mills about 15,000,000 feet of sawed lumber annually, the most of which has been cut into boards, about one inch thick, and some into scantling 3 inches by 4 inches, and some into plank, 1½ thick, the whole on an average, in deponent's opinion, would not average over 1½ in thickness.

That in deponent's opinion and belief there has been manufactured annually on an average on the Hudson River, and principally, at Glen's Falls, Sandy Hill and Fort Edward, (all within a distance of eight miles), during the last ten years 160,000,000 feet of sawed lumber. That for the last fifty years, large quantities of sawed lumber have been manufactured every year in said mill, and in deponent's opinion and belief, for the forty years next prior to the last ten years, not less than 100,000,000 to 115,000,000 feet of sawed lumber were manufactured annually on average. That from deponent's earliest recollections there has been a large business done on said rivers in manufacturing sawed lumber, (and which extend back upwards of sixty years), and with some fluctuations has been gradually increasing. That formerly, say thirty-five years ago, nearly all the lumber manufactured on said river was firm white pine timber and spruce, but white pine timber became more and more scarce, and has been manufactured less and less until the principal part of the lumber now cut on said river is spruce and hemlock. Deponent further says that he has not seen and does not know of any accumulation of saw-dust in said river to impede or in any manner inconvenience navigation on said river whatsoever.

That edgings have, more or less, as well as the saw-dust, been cast into the Hudson River; that deponent has seen in some of the eddies in said river small collections of edgings and saw-dust and flood wood and debris; but for the edgings, slabs, or other

firm substance to hold or confine the saw-dust in one place, it moves and floats about readily in the water, and is easily moved by any disturbing substance in the eddies, and will not remain in the channel of said river. That the feeder canal extends from the Hudson River to the Champlain, and intersects at the points where deponent's said mill is located on said river, and that in deponent's opinion and belief there has been for the last forty years about 35,000,000 or 40,000,000 feet of sawed lumber manufactured annually on the Hudson River above said canal. That deponent has owned and run canal boats on said canal, and transported lumber thereon ever since it was navigable, and more than thirty years, and that deponent has never known or heard of any obstructions from accumulation or collection of saw-dust on said canal. That from deponent's experience in the use of said river and canal, and the manufacture of lumber, deponent has no doubt whatever that saw-dust alone will not accumulate or collect in sufficient quantities to impede or impair navigation in the least. That deponent is now President of the First National Bank of Glen's Falls.

A. SHERMAN.

Subscribed and sworn to before me, }
this 31st day of Jan., 1871. }

G. BROWN,
County Judge.

APPENDIX No. 18.

STATE OF NEW YORK, } S.S.
Warren County. }

George Satterlee, being duly sworn, says: That he resides in the village of Fort Edward, in Washington County, in the State of New York, and is and for the last year has been the superintendent of the Glen's Fall Feeder Canal, and also of about twenty-five miles of the Champlain Canal, and of that part thereof into which the waters of said feeder are discharged. Deponent further says, that in the spring of the year 1870 deponent caused said portion of said canals, of which he is superintendent, to be cleared from deposit of whatever had accumulated therein.

That deponent was personally engaged in superintending the work, but did not find any deposit or accumulation of any saw-dust in either of said canals.

That deponent has resided in Fort Edward, through which said canal and the Hudson River both pass, for the last twenty years and upwards, and deponent has never known or heard of any accumulation or deposit of any saw-dust in either said river or canal to injure or inconvenience navigation in the least in either of them.

GEORGE SATTERLEE.

APPENDIX No. 19.

STATE OF NEW YORK, } S.S.
Warren County. }

Colonel Alonzo W. Morgan, being duly sworn, says: —That he is a resident of Glen's Falls, in said county, and has resided since the year 1813, and had charge of the Feeder Canal and about 15 miles of the Champlain Canal, as superintendent, for three years some 20 to 25 years ago, and as such superintendent had charge of making repairs on said portions of canal, (and which portions included about 14 miles of the summit level of the Champlain Canal), and keeping it clear and free from obstructions, and every spring during said three years cleared out the deposit from the bottom of the canal, but

that such deposit did not consist in any part of saw-dust. That no saw-dust ever collected or accumulated in said canal so far as deponent has any knowledge or belief. Deponent further says that when he first became acquainted with Glen's Falls there were four saw-mills at Glen's Falls, and also saw-mills all along for 30 or 40 miles above, and large quantities of white pine lumber were then being manufactured, but as to what quantity deponent is not able to say, as deponent is not a lumberman. That, as deponent understands and believes, saw-mills were erected on the Hudson and Glen's Falls and vicinity, and the manufacture of lumber commenced, about 90 years ago or upwards, and has been continued ever since. That deponent never heard of any complaint or trouble as to navigation on the canal or Hudson River, from saw-dust, and never knew of any injury therefrom, and deponent does not believe navigation has been injured in the least by saw-dust.

COL. A. K. MORGAN.

Submitted and sworn to before me, this }
31st day of June, 1871. }

S. BROWN,

County Judge, of Warren County.

APPENDIX No. 20.

STATE OF NEW YORK, } (S.S.)
Warren County. }

George Nelson, being duly sworn, deposeth and saith :—That he resides in Still Water, in Saratoga County, New York, and is superintendent of all that part of the Champlain Canal, in the State of New York, southerly of that part thereof of which G. Satterlee is superintendent, and has been such superintendent for the last year. Deponent further says that he has resided near said canal, and been familiar with it and its condition and the business done thereon for the last thirty-five years. Deponent further says that in the spring of the year 1870, deponent, as such superintendent, caused that portion of said canal in his charge, as aforesaid, to be quite thoroughly cleared of the sediment and deposit therein, and deponent superintended the work personally, to the extent of his whole time thereon. That said Still Water is located on the west bank of the Hudson River, about 30 miles below Glen's Falls, in Warren County, New York. Deponent further says that he found no saw-dust in said canal in cleaning out the same, and deponent has never known or heard of any accumulation of saw-dust in said river or canal, or any injury or inconvenience resulting to navigation in said river or canal therefrom at any place or time.

GEORGE W. NELSON.

Subscribed and sworn to before me, }
this first day of July, 1871. }

S. BROWN,

County Judge, of Warren County.

APPENDIX No. 21.

STATE OF NEW YORK, }
Warren County. }

William Coleman, being duly sworn, saith :—That he resides in the town of Kingsbury, Washington County, and State of New York, and in the immediate vicinity of the Feeder Canal, and has so resided for thirty years last past. That deponent has been

superintendent of said Feeder Canal and that part of Champlain Canal which the Feeder Canal discharges its waters into, for about eight years.

That among others, it was deponent's duty to keep said canal free and clear from all obstructions, and occasionally deponent caused the sediment to be cleared from the bottom of the said canals of which deponent was such superintendent, but never found any accumulation of saw-dust in said canal, but did find sand, dirt and mud. That deponent has been well and familiarly acquainted with said canal and its navigation for over thirty years last past. That the canal has never been obstructed, filled, nor partially filled with saw-dust, (*except as the same flowed with the currents of the water*), nor has the navigation thereof been in the least impeded or interfered with by saw-dust. Deponent further says that he has never heard of any trouble from the saw-dust, in the Hudson River, relative to navigation, nor any complaint against or objection to its being deposited or cast into the rivers by forwarders, boatmen or any one connected with the navigation of said canals or river; in deponent's opinion and belief there is no objection whatever to said saw-dust being cast into the water, so far as navigation is concerned. That deponent qualifies the above statement as to deponent's being superintendent, by saying that deponent held the office but two years, but was agent for Mr. Sherwood, (now dead), who was superintendent for the rest of the time, (said eight years), and had the actual management and control of the business in relation to the canals, Mr. Sherwood not giving much personal attention to the business.

WILLIAM COLEMAN.

Subscribed and sworn to before me, this }
31st of January, 1871.

S. BROWN,
County Judge, of Warren County.

APPENDIX No. 22.

* STATE OF NEW YORK, }
Washington County. }

Orson Richards, having been duly sworn, states:—That he resides in the town of Kingsbury, in Washington County, and State of New York. That deponent is engaged in the business of manufacturing lumber on the Hudson River, and has been for the last thirty years; that deponent has one saw-mill which runs over two hundred saws, and is partner of four other mills, and is familiar not only with the sawing business, but also with all the other branches of the trade, as well the running the logs to the mills as transporting the lumber to market, by boating the same on the canal and otherwise; that deponent's largest mill is located on the said Hudson River, about thirteen miles below Glen's Falls; that deponent has been familiar with the said river and the business done thereon for the last thirty years and upwards. In deponent's opinion and belief there has been manufactured on the said river, annually, on an average, for the last ten years, at least 150,000,000 or more of sawed lumber, and before ten years last past, for the last twenty years, an average of not less than 120,000,000 or upwards of sawed lumber; that in deponent's opinion and belief, prior to fifteen years ago, there has been as much as of sawed lumber cut upon said river and its tributaries per year, (and which would average perhaps about one inch and one-eighth of an inch in thickness), above the point where the Feeder Canal intersects the river, and the saw-dust made therefrom as well as more or less of the other refuse cast into the waters to be carried off. Deponent further says that he has never known or heard of any obstruction, hindrance or injury to boating, rafting or navigation from such saw-dust refusion on

the river or canal. Deponent says that he has never heard or known of any accumulation of saw-dust in said canal or river whatever, alone, nor with other substances, except that in some of the eddies of the river the edgings and slabs have collected, and more or less saw-dust has been stopped and held by the accumulation of such firm substances, nor has deponent ever heard or known of any such accumulations as last described being found at any place or places in the least injurious to the use of the river for all floating and navigable purposes. Nor has deponent ever known or heard of any complaint by boatmen or others of saw-dust being put in the rivers, nor has any objection ever been made to saw-dust and other refuse being cast into the waters, so far as he has any knowledge, information or belief in the premises. That deponent discharges large quantities of saw-dust and some edgings into the river every year. That as to the other refuse, saw-dust, there has been less and less cast into the river in proportion to the lumber manufactured, as such refuse has become more and more valuable for other purposes, and it became the interest of the manufacturer to save it. That so far as deponent has any knowledge, information and belief on the subject, all manufacturers of sawed lumber on said river have been guided and controlled as to casting and throwing into the waters thereof the saw-dust and refuse of and from sawed lumber by their own interest and wishes, and that no injury has arisen therefrom, or at least none so far as deponent knows or has ever heard of to navigability of said river or canal.

ORSON RICHARDS.

Sworn before me, this 11th day of }
February, 1870. }

W. McCOLLIN,
Notary Public.

APPENDIX No. 23.

Area of territory drained by the River Ottawa and tributaries above the city of Ottawa is 43,000 square miles; add 19,000 square miles for area drained below Ottawa and above Grenville, making a total area of 62,000 square miles, not including about 4,000 square miles more below Grenville.

By the Report to the Canadian Legislature by T. C. Clarke, Esq., C. E., of his survey for the Ottawa canal navigation, the *mean* discharge of the Ottawa (by a series of obstructions) at Grenville is 85,000 cubic feet at low water, and 150,000 cubic feet at high water.

Forty inches may safely be taken as the average precipitation of rain and snow in Canada on the Ottawa.

It would seem necessary to assume a greater average, in order to account for the great delivery of the Ottawa, compared with the area it drains.

A. J. RUSSELL.

APPENDIX No. 24.

PORTLAND, ME., August 27, 1872.

Hon. H. H. KILLALY, &c., &c., &c., }
Toronto, Ontario. }

DEAR SIR,—I have the pleasure to acknowledge the receipt of your letter of the 13th instant, making enquiry concerning the condition of the Penobscot and other rivers, the navigation of which has been more or less injured by the "waste" (slabs, edgings and saw-dust) from saw-mills; and, in reply, to state that in my examina-

tion of several rivers (in all cases tidal rivers) I have found that this "*waste*" has been accumulating for the last forty years and more, and to such an extent as to have *greatly impaired the navigation* of those rivers. This "*waste*" on being thrown into the rivers is carried up and down by the tidal currents until, becoming heavily water-soaked, it sinks in slack water or eddies and *forms constantly increasing obstacles to navigation*. In all the rivers in the State of Maine these obstructions, if formed by slabs and edgings, don't extend more than four miles below the head of tide water, as in the Penobscot River, and in the smaller rivers not more than one mile below, whilst the *saw-dust* is, for the most part, carried by the current several miles further down and deposited on the slack water and *eddies of the bends and bays, these forming extensive shoals, shifting in their character and having narrow and crooked channels*.

In Penobscot River these slabs and edgings have accumulated, in some places, if not less than eighteen feet, with an average depth of about ten feet, over an area of not less than two hundred and seventy-five acres, the solid contents of which are more than four millions of cubic yards.

It is but recently that these facts have attracted public attention to such a degree as to have proved the necessity, for the prevention in future, by statute, of the throwing in of *slabs* and edgings; but *not yet*, it is much to be regretted, that of *saw-dust* also. It is, however, believed that this will be prevented at an early day, so great is the damage caused by it.

During the past two or three years I have been very successful in the removal of these obstructions by means of dredging machines, provided with clamshell (skeleton) buckets, in which work the difficulty consists not so much in the excavation of the material as in the disposing of it afterwards.

To give you an idea of the cost of the removal of this material, I will state that within the past ten days a proposal has been made to excavate and remove about twenty-five thousand cubic yards of this material, at seventy-five cents per cubic yard, by contract, which proposal I shall probably accept.

I regret that I have no special report on this subject to send to you, and that the information herein furnished you is so meagre in its character.

If I can be of any further service to you in this matter, I beg that you will let me know.

I am, Sir,

Very respectfully yours,

GEORGE THOM,

Brev. Brigadier General, U. S. A.

APPENDIX No. 25.

H. H. KILLALY, Esq., }
Toronto.

MIRAMICHI, 16th May, 1872.

DEAR SIR,—In reply to yours of the 27th ult., in reference to the state of the rivers in this Province, I beg leave to say that on the Miramichi River and its tributaries, there are a number of mills, some driven by steam and others by water. Some of the steam mills have been in the habit, for years, of depositing, and still continue to deposit, a greater part of the saw-dust made by them into the river, as well as bark, slabs, and edgings, most of which do not go far from where they were deposited till they sink and remain there, which has been proved by the depth of water in the harbours of this river, especially about our wharves, where it is more perceptible.

Fifteen to twenty years ago, at any of our wharves there was twenty feet of water, but now there is not more than from ten to twelve feet, causing wharf-owners to extend their wharves nearer to the channel. The material that composes the filling up is saw-dust, slabs, edgings and other refuse matter deposited from mills, mixed with a small portion of mud. I may safely state that all the water-mills on the main

river, as well as its branches, deposit the most of the refuse matter with the streams, which has had the effect of filling up all the small harbours, coves and creeks on the river, which is readily perceived by comparing them with what they were a few years ago. At one time the bed of the river, or at least along the shores and creeks, was composed of sand and gravel, but now it is chiefly refuse matter from saw-mills. This practice has also had an injurious effect on fishing.

Where a large quantity of alewives, salmon and bass used to be caught, now the catch is very small, and the bass have entirely disappeared from the south branch of the Miramichi; whereas, on the north-west branch they are still caught in large quantities, which is accounted for by only one mill being in operation on the north-west branch for several years past; on the south-west branch there are several mills in operation.

Our harbour-master is supposed to look after the river and protect it against all injurious deposits; in the towns of Chatham and Newcastle he prevents such deposits, but there are so many mills strewn along the river that it is difficult for him to watch them all. At some mills, slabs and edgings are rafted under pretence of being taken away for firewood, but at night are set adrift, and lodge all along the wharves and shores; a greater part of these are pine, and sink almost immediately after being put into the water.

This same custom, I may say, exists all through this Province, but to a greater extent on the northern portion.

I would strongly recommend that the Government would take this matter into their careful consideration, and devise some means of preventing the depositing of all mill refuse in our rivers. If not attended to in time, it will destroy our fisheries altogether, as well as interfere seriously with the navigation of our rivers.

I would suggest that the penalty for casting any mill refuse in the streams should be punishable by imprisonment of the owner of the mill, or the person in charge of same, as there is no use in putting on a small fine, as they would sooner run the risk of being fined than imprisoned.

I would be pleased to be of service to you at any time.

Yours very truly,

WM. MUIRHEAD.

AN ACT FOR THE BETTER PROTECTION OF NAVIGABLE STREAMS AND RIVERS.

[Assented to 23rd May, 1873.]

Preamble.

WHEREAS it is expedient to provide for the better protection of navigable streams and rivers: Therefore, Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

No Saw-dust, etc., to be thrown into navigable streams.

1. From and after the passing of this Act, no owner nor tenant of any saw-mill, nor any workman therein, nor other person or persons whosoever, shall throw or cause to be thrown, or suffer or permit to be thrown, any saw-dust, edgings, slabs, bark or rubbish of any description whatsoever, into any navigable stream or river, either above or below the point at which such stream or river ceases to be navigable.

Penalty for contravening this Act.

2. Any person or persons violating the preceding section shall be liable, for the first offence, to a fine of not less than twenty dollars, and for the second and each sub-

sequent offence, to a fine of not less than fifty dollars, which fine shall be recoverable summarily in the same manner as provided for the recovery of penalties by "The Fisheries Act."

Fishery officers to enforce this Act.

3. It shall be the duty of the several fishery officers to examine and report on the condition of the navigable streams and rivers under this Act from time to time, and to prosecute all parties contravening the terms of this Act; and such officers shall, for enforcing the provisions of this Act, have and exercise all the powers conferred upon them for like purposes by "The Fisheries Act."

Exemptions by proclamation in certain cases.

4. Provided always, that when it can be shewn to the satisfaction of the Governor in Council that the public interest would not be injuriously affected thereby, the Governor in Council shall have power, from time to time, by proclamation in the *Canada Gazette*, to declare any such stream or river, or part or parts thereof, exempted from the operation of this Act in whole or in part, and shall also have power, from time to time, to revoke the same.

ERRATUM

For pages 17-18 referred to at page 600, paragraph 7, read pages 599-600.

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E R R A T A.

Page	Line from top of Page	Line from bottom of Page	Instead of	Read
<i>Minister's Report.</i>				
XXIX	19	.....	31 Vic., chap. 60.....	36 Vic., chap. 60.
XI.	8	.....	33 Vic., chap. 12.....	33 Vic., chap. 23.
XI.	10	.....	47 Vic., chap. 7.....	42 Vic., chap. 7.
<i>Appendix.</i>				
16	Item 16	8	Quebec Post Office—1877, \$11,186.95.	Montreal Post Office—1877, \$11,186.95.
38	" 5	25	Chicoutimi River, Saguenay pier.....	Chicoutimi pier, Saguenay River—first column.
44	" 2	20	Chateauguay River—\$1,602.99 in column of 1877.	Transfer \$1,602.99 to column of 1877, opposite St. Francis River.
46	.....	Bottom of page.	(a) including "\$2,000".....	(a) including \$2,400.
68	Item 7	5	Salmon River.....	Thames River.
72	" 3	.....	Number 8.....	Number 3.
73	Line 3	.....	Manitoba and North-West Territories entered Confederation "1st July, 1870."	"15th July, 1870"—at head of seventh and eighth columns.
86	" 5	.....	Year ended 30th June, "1848.".....	"1878"—at head of fourth column.
87	Item 14	5	\$490,593.36—last column.....	\$501,780.31.
87	Carried forward.	.....	\$1,184,310.42—last column.....	\$1,195,497.37.
88	Item 27	.....	\$105,088.40—third column.....	\$93,901.45.
88	" 2	16	"Hastings East"—second column.....	"Hastings West."
89	Brought forward.	.....	\$1,184,310.42—last column.....	\$1,195,497.37.
89	Item 27	.....	\$105,088.40—last column.....	\$93,901.45.
108	" 7	12	"Montmagny"—second column.....	"Verchères."
108	" 12	7	"Yamaska"—second column.....	"Richelieu."
112	" 35	11	Presqu'Isle, Georgian Bay, Grey.....	Presqu'Isle, Lake Ontario, Northumberland East—first and second columns.
112	" 43	3	"Hastings"—second column.....	"Northumberland East."
116	" 3	35	\$3,283.79—third column.....	\$1,680.80.
116	" 18	21	\$14,218.51—third column.....	\$15,821.50.
117	" 3	36	Chateauguay—\$3,283.79.....	\$1,680.80—last column.
117	" 18	21	St. Francis River—\$14,218.51.....	\$15,821.50—last column.
138	" 11	5	"River Salmon"—first column.....	"River Thames."
145	" 4	6	Esquimalt Graving Dock, 1881.....	\$9,891.00—omitted in column 1881.
145	" 4	6	\$37,769.22—last column.....	"\$47,660.22."
145	Totals.	5	\$3,292,769.22—last column.....	\$3,302,660.22.
149	.....	19	place is.....	plan is.
149	.....	3	BUNKER'S ISLAND.....	BUNKER'S ISLAND.
152	.....	11	and pavilion.....	and pavilions.
152	.....	3	the entrance.....	three entrances.
153	3	.....	Keystone.....	Keystones.
156	25	.....	wood and have.....	wood and have.
156	.....	5	a dining room.....	a dining room.
161	.....	22	were converted.....	were converted.
161	.....	15	BARRACK BUILDING.....	BARRACK BUILDING.
162	.....	4	ons storey.....	one storey.
163	26	.....	the hanches.....	the haunches.
165	.....	4,16 & 19	Commissioners.....	Commissioner.
167	25	.....	Temiscouata Barrack or Fort Ingal....	This is a special heading.
167	.....	5	stone foundation.....	stone foundations.
170	.....	4	Commissioners.....	Commissioner.
171	3	.....	do.....	do
178	.....	4	running the.....	run the.
181	.....	6	Marine and Defence.....	Militia and Defence.

ERRATA.—Continued.

Page.	Line from top of Page.	Line from bottom of Page.	Instead of	Read
<i>Appendix—Continued.</i>				
182		11	PORT WELLINGTON	FORT WELLINGTON.
183		4	16 and 31	16 to 31.
184	25		in 1875	in 1878.
191		8	sn a lot	on a lot.
193		9	outbuilding	outbuildings.
193		3	building	buildings.
193		1	Engineer's	Engineers.
193		1	magazine	magazine.
194	24		depth of	depth of 67.
194	25		heat 6	heating.
195	7		guagers	gaugers.
198		16	were	was.
199		5	Custom	Customs.
208		20	10 foot	10 feet.
212		17	\$3,000	\$5,000.
215	18		Belleveau Cove	Belliveau Cove.
217		4	\$12,218.44	\$12,295.09.
218	4		have been spent in	\$600 have been granted for.
227		4	depth of inside	depth inside.
233	18		Frederickton	Fredericton.
242	10		Wert Point	West Point.
245		11	blank	24 feet.
248	16		Some years ago	In April and May, 1870.
249	9		\$6,303.16	\$6,603.16.
249	23		Piers	Pier.
250		4	\$3,627.82	\$3,617.82.
252	10		low spring tides	low water spring tides.
255	11		\$417.23	\$417.43.
256	6		Cedars Rapids	Chute-aux-Bouleaux.
256	11		12 feet	24 feet.
256	25		Chute à Bouleaux	Cedars Rapids.
260	1		Shannonville	Shannonville.
263		25	after page 77 add	and at App. 14, pages 516 to 534.
267		13	water water the	water at the.
268	4		1856-77	1856-57.
268	6		maintained the	maintained by the.
268		16	500 cubic feet	500 cubic yards.
272	22		After "Thunder Bay" add	on Lake Superior.
272		5	\$4,178.13	\$4,178.63.
275		13	mouth of the employed at the	employed at the mouth of the.
276	13 & 15		St. Frances Lake	Fort Frances Lock.
276	15		Appendix No. 20	Appendices Nos. 19 and 30, pages 652 and 826.
279		4	Tormentine	Torment.
280		23	Magdalen Islands	Bay of Chaleurs.
281	25		In blank under names of Counties	Bacot Hayes Shoal "Soulanges County."
285		6	in 1860	in 1870.
285		1	Under heading of depth of water "71 feet"	7 feet.
298		2	trebbled	trebled.
308		2	Irving	Fruing.
310		4	Dumaresq	Dumaresq.
314	Item 19		High Water Full and Change	High Water Full and Change
		9	Rise of Spring Tides	Rise of Spring Tides
		4	Rise of Neap Tides	Rise of Neap Tides
		2	Reference 12295	Reference 22295.
320	1		floating ice	floating ice.
325		15	wet dock	tidal dock.
331	18			

ERRATA.—Continued.

Page.	Line from top of Page.	Line from bottom of Page.	Instead of	Read.
<i>Appendix.—Continued.</i>				
352	21	.....	scarp.....	carp.
353	10	.....	Chomouchoaun	Chomouchouan.
354	18	.....	above	above.
354	26	.....	Historie	Histoire.
354	26	.....	signified.....	signifies.
355	.....	22	Mistassina	Mistassini.
355	.....	20	F. C. S.	F. G. S.
361	.....	23	December.....	September.
362	.....	13	Chief River on.....	Chief River or
363	.....	14	Crossess	Crosses.
365	5	.....	48° 42'	48° 44.75'.
365	.....	17	Omitted after "White birch" ..	red and white spruce, firs and scattered.
383	.....	22-23	are then covered by water and which shelter them at ebb-tide.	which shelter them at ebb-tide, are then covered by water.
398	6	.....	Rea	Rae.
407	.....	2	Cartier.....	Carlier.
411	10	.....	Coats	Coasts.
416	4	.....	E. C. Tache	E. E. Taché.
418	.....	10	circular.....	circular.
419	.....	3	Stewart.....	Stuart.
421	.....	10	Ouiatchonanish.....	Ouiatchouanish.
431	.....	2	going going	going.
433	4	.....	Kinogami.....	Kinogami.
434	18	.....	Herbertville	Hébertville.
434	.....	14	St. François Xavier.....	St. François-Xavier.
434	.....	15	Along.....	Along.
445	.....	1	18° 0' W.....	18° 0' W. in 1881.
446	15	.....	estuaries.....	estuaries.
448	1	.....	Report of.....	Report on.
474	3	.....	In blank after pp.....at end of line..	471-472.
484	2	.....	page 842.....	page 482.
486	2	.....	Deleware.....	Delaware.
498	11	.....	fates.....	rates.
498	11	.....	trade the St. Lawrence.....	trade of the St. Lawrence.
532	.....	12	1876—App. p. 100.....	1875—App. p. 109.
562	4	.....	Department at.....	Departmental.
563	25	.....	estimate of the work upon	estimate of the work upon it.
573	.....	13	1834.....	1874.
585	24	.....	it is highly desiable.....	it was highly desirable.
598	19	.....	it is asserted that by water.....	it is asserted that the discharge of saw-dust from mills driven by water
598	31	.....	As Lindsay	At Lindsay.
600	.....	9	pages 17 and 18.....	pages 594 and 598.
601	14	.....	pages 72, 73, 74.....	pages 590-591.
603	4	.....	saw-dust in hard bottom	saw-dust on hard bottom.
610	.....	6	D'Huissou.....	D'Aubuisson.
624	.....	10	with a specific gravity of say 1.5 feet.	with a specific gravity of 2.25 is moved by a current of say 1.5 feet.
630	.....	8	July.....	February.
635	15	.....	June, 1871.....	January, 1871.
635	.....	9	July, 1871.....	February, 1871.
636	.....	13	about thirteen miles.....	about three miles.
636	.....	1	refusion on.....	refuse in.
637	.....	15	obstructions.....	observations.
638	12	.....	in some places of.....	in some places to a depth of.
643	.....	18	Maisonette light house, Province of Quebec.....	Maisonnette lighthouse, Province of New Brunswick.
643	.....	13	Appendix 3, page.....	Appendix 3, page 252.

ERRATA.—Continued.

Page.	Line from top of Page.	Line from bottom of Page.	Instead of	Read
<i>Appendix—Continued.</i>				
647	.....	3	On the 11th.....Ste. Marie Canal was stopped.....and the troops disembarked	as on her previous trip the steamer.... Ste. Marie Canal, had been stopped .....the troops were this time disembarked.
648	35	.....	this 208 miles.....	these 208 miles.
648	36	.....	and at each.....	and each.
648	39	.....	reached on the 29th	reached on the 9th.
662	17	.....	Port Viau	Pont Viau.
732	.....	at bot'm	1867.....	1882.
911	.....	18	Sault Ste. Marie, Ont.....	Sault Ste. Marie, U.S.
939	.....	9	In blanks opposite 1875, Victoria, B.C.	Insert 453 vessels, 193,481 tons and 7,090 men.
1025	.....	4	Commissioners.....	Commissioner.
1028	10	.....	Under subject BRIDGES, 1882, 45 Vic., cap. 27.....	cap. 37.
1028	13	.....	Under subject BUOYS, &c., provisions.	provision.
1028	21	.....	Under subject COW BAY BREAKWATER. Cow Bay, and	Cow Bay, N.S. and.
1028	.....	4	Under subject PICTOU, N.S., 1872, 36 Vic., cap. 63.....	1873, 36 Vic., cap. 63.
1029	15	.....	Under subject Three Rivers, 1882, 45 Vic., cap. 42, p. 229.....	45 Vic., cap. 52, page 224.
1029	18	.....	Under subject LIGHTHOUSES, further provisions	further provision.
1029	.....	3	Under subject RIVERS AND STREAMS, add	An Act for the better protection of navigable streams and rivers, 1873, 36 Vic., cap. 65, page 281 of Statute.
1030	.....	11	Under subject SUPERANNUATION, 1875, 38 Vic., cap. 8, p. 64	1875, 38 Vic., cap. 9, p. 64.
1041	.....	21	qui sera public.....	qui sera publié.
1145	11	.....	13th June.....	13th June, 1854.
1146	9	.....	1882—fourth column	1867.
1148	9	.....	1882 do	1867.
1148	.....	8	\$312,255.49—fifth and sixth columns.....	\$352,255.49.
1148	.....	8	\$3,446,990.60—last column.....	\$3,466,990.60.
1148	.....	2	\$4,574,181.86 do	\$4,574,181.61.
1150	9	.....	1882—fourth column.....	1867.
1151	6	.....	\$496,797.89	\$496,797.80
1151	.....	2	\$143,325.97—in remarks.....	\$143,225.97.
1159	12	.....	Lock Homes do	Lock Houses.
1160	.....	3	\$746.65—fifth column.....	\$748.65.
1161	.....	3	\$746.65—first and second columns.....	\$748.65.
1161	.....	6	Lakes of Huron and	Lakes Huron and.
1162	.....	1	\$23,447,578.57—fourth column.....	\$23,257,578.57.
1169	.....	15	14 acres	13 acres.
1172	Item.	2	Woodstock Marine Hospital.....	Westcock Marine Hospital.
1177	.....	1	Lévis Gate	St. Louis Gate.
1179	5	.....	Lévis Gate	St. Louis Gate.
1182	Item 1	Col. 1	\$862,302.02	\$862,302.03.
1187	" 7	.....	and in two storeys high.....	and is two storeys high.
1187	.....	15	Grand Trunk Railway Building. Is.....	Grand Trunk Railway. Building is.
1188	Col. 2	1	\$456,037.04 .....	.....
1188	" 3	1	\$557,022.13.....	\$456,037.04.
1189	.....	23	Becher, Barker and Steele.....	Becher, Barker and Street.
1191	1	.....	Consists.....	Consist.
1191	20	.....	being a frontage	having a frontage.
1202	Item 5	Col 5,6,7	\$78,339.51—Victoria P. Office.....	\$78,329 51.
1202	" 7	"	\$18,835.43—Victoria M. Office.....	\$18,635.43.

ERRATA—Concluded.

Page	Line from top of Page.	Line from bottom of Page.	Instead of	Read
<i>Appendix—Concluded.</i>				
1202	Item 4	ol. 5	\$1,731,402.00.....	\$1,731,402.09.
1210	" 28	"	\$19,764.53	\$19,754.53.
1211	" 25	" 6	\$16,042.57	\$16,042.87.
1214	" 15	.....	Emboulements.....	Eboulements.
1230	.....	8	4th col. \$229,946.72	\$229,246.72.
1231	6	.....	App. No. 1, page 11—\$57,384.85.....	App. No. 1, page 115 \$7,384.85.
1233	Item 1	.....	Grand River—6th column—\$8,973.97	\$8,963.97.
1238	.....	.....	Brought forward—5th col. \$21,532.79.	\$21,532.29.
1241	.....	1	last col. \$714,361.36.....	\$714.36 1.36.
1243	.....	9	last col. \$13,591.57.....	\$13,501.57.
1247	.....	11	obtaining upwards.....	draining upwards.
1251	.....	14	First slides.....	Fish slides.
1268	Item 2	.....	last col. \$23,101,055.24.....	\$23,101,055.25.
1268	G. Totals.	1	\$182,375,351.33.....	\$182,375,351.83.
1271	.....	1	\$98,640,307.09	\$98,640,307.20.
1271	.....	2	\$3,397,809.20	\$3,397,809.31.
1274	Item 6	.....	1st col. \$120,044.76.....	\$120,044.65.
1274	" 10	.....	2nd col. \$52,619.45.....	\$51,619.45.
1275	" 4	.....	9th col. \$84,494.87.....	\$84,494.77.
352	21	.....	brochet	pike.
794	Item 5	41	water. Three Rivers.....	water at Three Rivers.
806	.....	17	\$580.75—last column	\$576.75.
806	.....	16	\$580.75 do	\$576.75.
808	.....	16	1st col.—mean elevation above Tide	
			Water at Albany.....	at New York.
807	2nd Col.	14	Depth of w'r on lower sill, Look	
			No. 1.....	(To be struck out).
808	10	1st Col.	1879, and to October, 1881.....	1879, and to 6th October, 1881.
841	5	.....	Port du Fort.....	Portage du Fort.
863	.....	13	Shaldrac	Sheldrake.
867	.....	8	West end of Port Daniel.....	West Point of Port Daniel.
898	5	2nd Col.	Item Glenora—"100".....	160.
1113	Item 8	4	4th col. \$854.75.....	\$864.75.
1120	" 3	6	6th col. \$57,668.67	\$57,688.67.
1121	.....	19	last col. \$3,922.65.....	\$3,922.95.
1121	.....	17	2nd col. \$1,436.13.....	\$1,436.33.
1121	.....	17	3rd col. \$3,030.42	\$3,030.43.
1123	.....	14	5th col. \$108,639.13.....	\$108,639.63.
1131	11	.....	5th col. \$653.....	\$663.
1134	.....	10	6th col. \$23,353.65.....	\$23,353.63.

Omitted at page 1235—Item 15.—Rivière du Nord:—The expenditure since Confederation is for the removal of a number of boulders (in 1880 and 1881) from the bed of the channel, about $\frac{1}{2}$ a mile below the village, leaving a depth of $4\frac{1}{2}$ feet at low water over a width of 70 feet.

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S. D. Black	567 Maple St.	Los Angeles
T. F. Gray	890 Birch St.	Portland
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K. L. Brown	9123 Franklin St.	Milledgeville
L. M. Jones	9456 Washington St.	Waynesboro



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VIEWS AND PLANS.

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2. do do Parliament Building, Ottawa.....	208-209
3. do do do Library, do	208-209
4. do do East Departmental Building, Ottawa.....	208-209
5. do do West do do do	208-209
6. do do Post Office, Custom House and Inland Revenue Office, Ottawa..	208-209
7. Plan of Quebec Harbour Improvements at mouth of River St. Charles.	334-335
8. Plan of the Graving Dock at Lévis.....	334-335
9. do Toronto Harbour.....	534-535
10. do Graving Dock at Esquimalt, B.C.....	566-567
11. Perspective view of Union Suspension Bridge, Ottawa.....	654-655

MAPS

(Accompanying Report are not bound with it. They will be furnished in a separate cover.)

1. Map of the World's Submarine Cables and principal Telegraph Lines.
2. Map showing Dominion Government Telegraph Lines along the River and Gulf of St. Lawrence below Quebec, and along the sea coast of the Maritime Provinces.
3. Map showing Dominion Government Telegraph Lines in part of the Province of Quebec and of the Province of Ontario.
4. Map showing the Dominion Government Telegraph Lines in the Province of Manitoba and the North-West Territories.
5. Map showing the Dominion Government Telegraph Lines and Cables in the Province of British Columbia.

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